

## Built heritage and sustainability: Perspectives on value

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# **Built heritage and sustainability: Perspectives on value**

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## **Abstract**

The values associated with built heritage can be identified and defined in a number of different ways, often reflecting the perspective of the commentator. From the Australian perspective, the community's commitment to heritage protection predates that of the formal legislature but has been slower to act than many other OECD nations. The National Trust of Australia, as a community organisation, championed the cause of built heritage more than two decades before the government responded by legislative action. It was not until the 1970's that formal frameworks were established through statutory control mechanisms for the identification and protection of Australia's rich stock of heritage places (Irons and Armitage 2011).

Currently the national conscience is becoming more aware of the need to reduce our carbon emissions. The potential opportunity cost savings achievable by the more effective use of the resources embodied in existing built structures has re-emerged as an area of interest and the imperative for policies and practices across the board to achieve reductions in carbon pollution is becoming normalised, albeit not yet fully mandated. Set within this context, this paper seeks to review the multifaceted elements which contribute to our perceptions of heritage which may be equated to a reflection of our values incorporating yet transcending the merely economic (Ashworth 2002) and also identifies responses being developed to deal with these concerns from a sustainability perspective.

The paper considers some of the many meanings of the relevant terminology and discusses concepts of *cultural heritage*, of *place* and of *value* providing a preface to a review of the value of heritage from a number of perspectives. It considers the benefits of heritage conservation including potential environmental benefits, and offers a contemporary commentary on some economic, social and professional concerns with particular reference to listed commercial office premises and the need to measure carbon footprint of such buildings. Reference is also made to the role of refurbishment and carbon profiling as techniques for reducing carbon emissions based on case study examples.

**Keywords:** Australia; built heritage; carbon footprint; heritage and environment; heritage value; property value.

## **Built heritage and sustainability: Perspectives on value**

Placemaking has long been recognised as being as complex an activity as the places it seeks to manage. Healey commented quite recently (2010) that, in order to make places better for the stakeholders, there is a need for effective intervention. However, the complexities of urban place must recognise the plurality of purpose which placemaking needs to address as „systems better imagined as overlapping, loosely bounded and loosely coupled sets of relations“ in preference to a hierarchical approach (*op cit*: 226). The stakeholder perspectives of urban placemaking which are focal to the approach adopted in this paper are fairly loose and overlapping and revolve around the value-to-user standpoint of built cultural heritage and its relationship to sustainability. The users may be the owners who occupy their own premises or their tenants and range from the community, financial institutions, public and private occupiers and investors and all are members of the broader society. The main property type under discussion is heritage listed commercial property assets, most specifically office property, but as little research exists in this area quite a lot of the material used has been sourced from studies of residential property where transferable.

Before discussing the main theme of the relationship between built heritage and value these terms will be considered individually. So, firstly what do stakeholders mean by „built heritage“ and secondly what is „value“? The latter part of the paper looks at a case study of a commercial office development and the process of carbon profiling to measure, and thus limit, carbon emissions in the development and use of the property. The paper concludes with some issues of concern which have been identified by the Queensland Heritage Council (QHC).

### **Meanings of built heritage and heritage place**

Given that there are four levels of statutory control over heritage – international, national, state and local – plus community based approaches such as the National Trust and the Burra Charter, defining built heritage can be problematic. However, to simplify matters the following Commonwealth definition gives a good indication of what is meant. Gazetted in 1975, the Australian Heritage Commission Act (AHC Act) initiated the heritage legislative system at the national level and whilst this statute has been superseded, subsequent legislation has reaffirmed the tenets of the Act. The Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act), for example, provides a more contemporary reinterpretation of the original definition offered by the AHC Act. Section 528 of the EPBC Act defines the *heritage value of a place* as including the „place“'s natural and cultural environment having aesthetic, historic, scientific or social significance, or other significance, for current and future generations of Australians“. The EPBC Act also provides for a formal broadening in Australia's heritage focus and offers a more appropriate and inclusive contemporary interpretation of heritage with Indigenous heritage value being specifically referenced and defined within the EPBC Act.

For the purposes of the EPBC Act, *environment* includes the „heritage values of places“ (s. 528). As such, *heritage*, or more precisely *heritage value* is formally recognised as comprising a component part of the environment. A common misconception, rooted in the origins of heritage conservation practice, is that the terms *heritage* and *historic* are synonymous. This has the effect that „heritage means old“ and results in a mistaken interpretation all too often adopted.

## **Meanings of *value* and *market value***

In the general community, the term *value* as indicated by the OED (1976:1285), has nine separate entries the first of which is *worth, desirability, utility* which is clearly recognised when heritage value is being considered as would another: „*one's principles or standards, one's judgement of what is valuable or important in life*“. Such definitions reflect the emotion which is often appropriately associated with heritage and may encompass diverse or conflicting emotions and value judgements (expanded by Ashworth 2002) which may cause disagreement when scarce resources (e.g. for conservation or acquisition) may need to be allocated.

The various definitions of *value* also include *purchasing power, worth as estimated* and *valuation* which is where the perspective offered by this paper is focussed. When an individual or other entity wishes to acquire a property in the market, they have to outbid other interested potential purchasers and so the eventual price reflects the new owner having valued the property more highly than others who were not prepared to match their offer price. This is an individual transaction price and whilst it reflects the purchaser's opinion of value, a broader measure is required (in many cases) to establish value for, for example, balance sheet or other asset purposes or for establishing market value to support a mortgage. This broader measure is identified by the definition of market value as specified by the International Valuation Standards Council (IVSC), a not-for-profit organisation set up under United Nations' auspices. The *market value* definition is:

the estimated amount at which a property should exchange on the date of valuation between a willing buyer and a willing seller in an arm's length transaction, after proper marketing wherein the parties both acted knowledgeably prudently and without compulsion.

IVSC 2011

This definition creates some issues when valuing a heritage property if there is no general market for such property but where a heritage listed property is well located from a market perspective, its refurbishment *may* result in a premium price over comparably located property, for example in the commercial office market, whilst also reducing the potential carbon footprint.

## **Impact of heritage listing on commercial property value**

To consider the impact of heritage listing on property value as supported by empirical studies, there have been several in Australia, North America and Europe but most were undertaken in the 1990s and a comprehensive review of that literature may be found in Irons and Armitage (2011). Three of the more informative studies of commercial property are discussed below.

It is often asserted that heritage listing affects property value negatively for example with the constraint on a property's redevelopment potential having been one of the prompts for the emergence of transferable development rights from listed commercial properties to other sites in the same ownership. A study of non-residential property in Victoria by the Urban Consulting Group (UCG 1995:132) found that the reduction in value may be short-lived and closely associated with the date of listing after which the property market absorbs the new status. Increases in value have been noted when an area/place is listed as this creates added value through the certainty that the local built character will be maintained as with the value of individual properties such as in a streetscape for example



UCG (1995) concluded that there was a range of factors variously responsible for impact on the value of property with heritage listing including: „the nature of the building (building type); the condition of the building; the use of the building and the availability and feasibility of alternative uses; and the location of the building“. This led the authors to the very reasonable conclusion that „generalising conclusions regarding the impact of heritage listing on property value can be problematic“. (UCG 1995a)

Considering more specifically commercial property and heritage control in relation to development value, Dominy (2001) studied seven case studies in Sydney, Parramatta and Maitland. Both passive investment properties and properties that had been subject to adaptive re-use and/or redevelopment were considered. The focus for the former group of properties was on examining the impact of heritage controls on ongoing economic and financial performance and for the latter group of (refurbished) properties it was focussed on the financial feasibility of the individual development schemes on a cost/benefit basis, in light of the heritage controls imposed.

The principal finding from Dominy's study include:

- The economic viability of property development is „first and foremost dependent on market related factors which are not generally related to heritage consideration. The identification of unmet market demand, the presence of favourable market conditions and timing in the market cycle are essential prerequisites for economic success, regardless of whether a chosen property is heritage listed or non heritage listed“ (p. 174).
- In each redevelopment case study the individual nature of the heritage listing did not deter project commitment by a developer.
- Heritage listing, in the four redevelopment cases studied, did not affect negatively the projects' direct financial feasibility.
- Project costs overall were increased in all of the four development case studies due to their heritage listing but the costs were not significant and were found to be recovered and, in fact, were exceeded by the commensurate increases in project value gained via the development incentives which were generated through transferable development rights or other heritage offset bonuses.

Dominy focused exclusively on non-residential property and, as with the UCG study, stressed the dominant role of market-related factors – which are not generally a heritage consideration – in determining the economic viability of development projects.

The third study was undertaken in 2006 by International Property Databank for English Heritage, the Investment Property Forum and the Royal Institution of Chartered Surveyors. (IPD 2006) It is a major study, noteworthy given the number of listed office properties sampled at 221 and their value – GBP 1.6 billion. Whilst the study was national, three fifths of the sample of offices owned by investors (mainly superannuation funds, property investment companies and insurance companies) were situated in the West End of London. The listed properties differed from the total stock of offices held in investment portfolios by being older and also by being smaller. Except for the City of London and London Mid-town, rental values were lower than on the newer, unlisted buildings and investment returns (equivalent yields) were in-line with those of unlisted properties except in the City and Mid-town where they were lower (stronger). The report considered that „the long-term performance of listed and unlisted offices appears to have been identical at the national level“ and, even after the influence of the large stock of top-performing listed properties in the West End is discounted, the return on listed property shows only a 0.3%

weaker yield. When a longer term view is taken, from 1981 when IPD records began, a decline in the number of listed offices owned as a proportion of total office property held by the investors fell sharply: „Whereas the number of unlisted offices fell by 10% between 1981 and 2004, the number of listed offices halved.“ (IPD 2006:6) Their contribution to total capital value also fell from 8.3% in 1981 to 4.3% 23 years later in 2004.

The reasons for the reduced attraction of listed office property to the institutional investor is attributed to the institutions' increasing preference for large properties; the sale of smaller properties (which are more likely to be the listed ones) to private property companies and other investors whose assets are not covered by IPD records; a policy to update the portfolio and concerns of obsolescence in older buildings. In addition, a trend to acquire office property outside Central London (where there are fewer listed office buildings) also contributes to the decrease in the representation in the portfolios. Three positive characteristics of the listed office sample were noted (IPD 2006:i): outside London, there were fewer vacancies in listed buildings; future rental income growth for listed property was greater than for non-listed property (though that may be a feature of that particular market structure) and, in the longer term, lower refurbishment costs have been recorded by investors of listed compared to non-listed property suggesting „investors in listed offices have not had to spend more on refurbishment in order to attract and retain tenants.“

### **Sustainability and listed property performance**

Queensland Heritage Council (2009:6) proffers a number of reasons why heritage matters from a sustainability perspective. It recognises that conserving heritage places is a form of sustainable development which contributes to community identity but that the best way to protect historic places is to ensure their active use and good maintenance, often within a changing economic and/or social context. Direct economic benefits can accrue to both the community and to property owners through local area improvement and continuing use avoids the need in many cases for demolition as more gradual adaptation is more feasible and may be less costly than replacement by new construction.

When considering the value of heritage listed office property, it would be interesting to be able to identify the proportion of such property in use which is in public or private ownership as that in private ownership generally has to pay its own way without subsidy and if refurbishment and retrofitting can be found to be a viable economic outcome, the property can be well employed in the market, valuable resources can be retained and carbon footprints reduced. Asset valuations of buildings in public ownership can ensure effective operation of building services to contribute to a reduction in carbon dioxide emissions which can be reflected in the triple bottom line assessment. The increased value of productive heritage property can contribute to increased public income through the property rating system and indirectly contribute to subsidies for non-economic heritage property.

### ***Sustainability options for commercial property***

Although unique neither to heritage listed property nor to commercial property, the following examples of initiatives which are being promoted to support a reduction of carbon emission in buildings and the associated process of construction may be considered relevant to the current discussion.

## **1. RICS/BIS low carbon construction**

Whilst Australia is working its way towards a legislated and then a traded carbon emissions system, there is as yet no national framework established for low carbon construction although compliance with a range of performance standards at the national and state levels is well advanced and the early adoption of green office leases by government has been a strong incentive to property owners to ensure their buildings are attractive to this major sector of the leasing market.

In June 2011, the UK government Department for Business Innovation and Skills (UK BIS 2011) responded to a report of the Low Carbon Construction inter governmental taskforce (LCC IGT) noting, *inter alia*, the need to „demonstrate the benefits of low carbon construction ... in the public and private sector“, enable the industry to better understand future opportunity in this field and enable the market to flourish with appropriate „skills, research and innovation.“ One industry contribution to the debate is from the RICS (2011) which nominated several opportunities for the construction industry to contribute to government and industry programmes to promote low carbon construction. These include the need to consider: a standard method of carbon measurement for embodied carbon, low carbon procurement, appropriate use of „smart building“ systems/building information modelling (BIM), research into energy performance of buildings and places held in the public estate, research into the impact of low carbon credentials on the market value of property, more rigorous requirements for the fit-out of buildings, the extension of green leases for commercial property, life cycle cost assessment and the extension of enhanced capital allowances to incentivise more spending to reduce emissions.

Australia is recognised as a world leader in several of these categories (RICS 2011) particularly in respect of the green lease requirement of the public sector and in carbon accounting. Considering more specifically the role of carbon measurement in construction, a recent analysis undertaken by quantity surveyors and building economists WT Partnership (2011) indicates that „the nett trade cost of construction on a cradle-to-gate basis of embodied carbon will rise by 0.35% to 0.70% as a result of carbon pricing.“ Whilst this will be a substantial sum on a major construction project, compared to other areas of potential cost variability, it is not a large percentage of total costs of construction. If a cradle-to-grave approach is adopted, the carbon footprint of the building over its lifecycle increases and the durability of the building, such as with long lasting properties – many of which may be heritage listed – bears consideration. The longer economic life of the building results in a lower annualised carbon footprint and the deferment of the need to initiate a new structure with the highest incidence of carbon emissions occurring during construction is reduced.

## **2. Ropemaker Place case study**

Ropemaker Place is the redevelopment by British Land Plc of a site in Ropemaker Street in the City of London/London Borough of Islington to provide some 80,000 square metres of office space over 20 floors. The building was completed in 2009. A study of the development was completed by Sturgis and Roberts (2010) using a carbon profiling methodology (fully detailed in the report) which demonstrated that by identifying the building components and choosing materials, designs and techniques to reduce carbon equivalents „the building is shown to be performing overall 63% less than its notional (control) equivalent. What is also apparent is that the majority of these improvements are focussed on the operational side of the Carbon Profile.“ (Sturgis and Roberts 2010) Appendix 1 (op cit:43) of the report also makes recommendations for *all* buildings, stating „A few key areas exist that, if resolved at the design stages, can have a great

effect on a building's durability, longevity, value and overall carbon performance" Their study also highlights the role of the building's occupants who, for 98% of the structure's life between completion and redevelopment, are the source and control of a large part of the building's operational carbon emissions.

It should be noted that Sturgis and Roberts's comment that reduced carbon emissions „enhance value" needs to be viewed somewhat critically as there is no evidence in their study to support this assertion, particularly from a market perspective. The jury is still out on the effect on property value of enhanced green credentials and research from the USA (Eichholtz, Kok and Quigley 2010) found that, between their 2007 and 2010 studies, „the „green" premium decays over time: for every year of "label decay", the rental premium decreases by 0.4 % and the transaction premium decreases by 1.7%." This could be accounted for by the reduced impact of zealous early adopters being joined by more measured tenants and owners as well as from the impacts of a less buoyant American property and employment market during the study period.

## **Issues**

Queensland Heritage Council's 2009 Heritage Strategy (QHC 2009) provides a useful review of issues which remain to be addressed in order for the heritage which we value to be best managed. These include:

- Population pressure, development activity and a resources boom
- Local heritage is identified and protected in an inconsistent manner across the state
- Cultural heritage is not well recognised in the town planning process
- Economic data on the value of cultural heritage to the community is sparse
- Further incentives for owners of heritage property is needed
- The impact of cultural heritage on property values is not extensively researched
- The role of philanthropy from private and corporate donors is untapped
- The potential for heritage offsets to benefit heritage property and places needs strengthening
- Awareness of many aspects of cultural heritage management and contribution is limited in the community and government.

## **Conclusions**

The paper has attempted to link the concept of value from both a built heritage and a sustainability perspective which is a path which appears not to have been trodden by many other researchers, possibly for reasons which are self-evident. The author is very aware that the paper has strayed from its original intention which was to focus on heritage and market value but the decision to look more thoroughly at the impact of sustainability on development practice has greater urgency and is an avenue which is leading to further case study research currently being undertaken on other heritage listed commercial property. These limitations are a consequence of the dearth of material which relates specifically to the nexus between listed property and sustainability. This imbalance will be reduced when next year's conference paper will (hopefully) report on current research into listed buildings' sustainability profiles and performance more directly.

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# **Integrated Water-Energy-GHG Management for a Sustainable Future**

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**Abstract**

*Water and Energy are the mutually reliant fundamental infrastructure sectors. Water is critical for electricity generation and electricity is critical for water provision. Water security is closely linked to energy security and therefore the Greenhouse gas (GHG emissions). With ever increasing population and industrialization, the available water resources are under extreme stress and there is a pressing need to look for alternative water sources, water reuse and recycling by adopting integrated urban water management and also looking at the energy intensities of the proposed solutions. The nexus between energy and water supply is increasingly important due to water scarcity facing many regions around the world and efforts to mitigate GHG emissions. Energy use and its associated GHG emissions form an integral part in every step of the urban water cycle and wastewater treatment. This paper will discuss strategies to achieve the long term water and energy sustainability.*

**Keywords:** Sustainable, urban, development, Water, Energy

## **Introduction**

Sustainable water supply and wastewater collection is one of the most significant services and needs careful planning and management, not only in terms of infrastructure development, but also to maintain the minimal standard and continuity of the service. Water scarcity facing many regions around the world is also critical to Australia. With rapid population growth and resulting urbanization, water demand is on rise, hard pressing the finite global water resources, with per capita water availability steadily decreasing. As most major cities of Australia expand and existing areas are redeveloped, energy consumption associated with water distribution will increase. Also, water shortage for electricity generation puts extra pressure on energy sector (Hightower and Pierce, 2008). Water security and decarbonisation of the economy are the key defining challenges of this century. Population growth, intensive agricultural development, urbanisation and industrial growth are all leading to increased demand for water at the same time as environmental impacts of current water systems are being increasingly scrutinised. There is an increased concern about climate change globally and an urgent need for GHG mitigation options reflected in the Australian Government's Carbon Tax policy. As water industry is a big user of energy, it warrants for a paradigm shift in the way urban water services and energy services are managed, to prevent the demand exceeding the supply by considering both demand and supply options together. As many nations are now looking at alternative water supply options including rain water tanks, recycling and reuse, desalination etc. to provide future water security, it is critical to carefully assess the energy intensity, implications of associated GHG emissions and cost effectiveness of proposed strategies. This is, especially significant since most of these alternative water supply options have greater energy intensity than traditional sources (Cohen et al, 2004; Marsh and Sharma, 2007). Energy used to move water is estimated at 7% of total global energy use (James et al, 2002). Climate change adds further complexity in some regions by reducing water availability and it therefore increases the energy inputs and associated emissions to access and treat water (Kenway et al, 2008). Therefore, it is imperative to understand the water-energy nexus to enable the water sector to reduce its operational energy costs and reduce GHG emissions to facilitate the design of water and energy systems capable of realizing more synergistic benefits (Sattenspiel, 2009). This paper will discuss the integrated urban management along with energy and GHG emissions management.



## **Urban Water Cycle**

Traditionally, the water supply, sewage disposal and stormwater drainage in Australian cities have been considered separately which inhibits the interactions between these phases of water cycle to be understood and utilized to better manage the urban water provision. Therefore, the water authorities need to re-evaluate the traditional approach and seek alternative ways to minimise the impact of urban planning on environment by understanding the energy intensity of water provision and vice versa along with associated GHG emissions. This would require a more holistic view allowing all three components of water cycle, energy usage & GHG emissions and their interactions to be considered together throughout the various stages of urban water cycle.

In most countries, the water is extracted from aquifer or surface water body, transported to a water treatment facility where it's treated and purified to drinking water quality standard and distributed to consumers. The waste water produced by consumers is transported to wastewater treatment facility for treatment and disposal without or minimal recycling or reuse. The stormwater from individual household and public places is collected and transported by stormwater drainage system and released into the environment without any pre treatment. So it's a single use approach, water is used only for one use and discarded and a very high quality drinking water is generally used for all the end uses including toilet flushing, irrigation etc. which does not need high quality drinking water. This presents an opportunity to provide fit for purpose water by reusing the rainwater and recycling the grey water. As water resource is limited and the ever increasing population and industrialization is putting significant stress on the aquifers & river systems and on the infrastructure network to transport water and wastewater, single use of water is not sustainable.

The stormwater drainage from urban regions to avoid flooding is very costly as well as puts enormous pressure on the receiving water ecosystems as it brings heavy loads of contaminants and sediments from the urban areas. Therefore, there is a need to adopt a system approach considering imported water, wastewater and rainwater as a system in which output of one subsystem feeds as input to another subsystem, called Integrated Urban Water Management (IUWM) and also to look at the energy intensity of each step. The main objective of Integrated Urban Water Management is to optimize the urban planning and management of water cycle by rainwater collection, stormwater harvesting and wastewater reuse, and is also called Water Sensitive Urban Design

(WSUD). It is based on the principle of diversifying water source options that connect with reinforcing sustainable water use for improved micro-climates benefits like healthy waterways while providing low carbon supply options, reduced imported water demand, reduced pressure on the water supply and wastewater collection infrastructure, enhancing community well-being and liveability (Mouritz, 2007)

The rainwater falling on the roof is quite clean and can be harvested and used on site to reduce the demand for imported water considerably. Coombes et al, [2000, 2002] reported that rainwater collected from roofs in an inner city area and stored in tanks was of acceptable quality for hot water, toilet and outdoor uses. Also, the quality of rainwater improved in rainwater tanks. The collection and use of rainwater can provide significant savings in amount of imported water required & distribution infrastructure and stormwater infrastructure requirements along with reduced flash flooding and improved stormwater quality. Stormwater harvesting reduces the pollution load considerably reaching the waterways. The other potential source is recycling the grey water. Mitchell et al [1997] and Troy [2004] reported that the use of treated wastewater for outdoor and toilet flushing can significantly reduce water demand and sewage discharges. Demand management is a significant tool aimed at increasing the system efficiency at utility level and end use level, promoting locally available resources and water efficient appliance use (White & Fane, 2002). This can be achieved by a mix of behavioural and technical changes.

### **Water Energy Nexus**

In 2010, Melbourne Water supplied 361 GL of drinking water to the retail water businesses and treated a total of 271 GL of sewage at the eastern and western treatment plant. Melbourne Water is among the top 15 electricity users in Victoria and the top 150 in Australia and used 1.64 PJ of energy in 2009/10 (1.416 PJ in 2008/09) costing \$20.2 million on energy compared with \$17 million in 2008/09. Operational GHG emissions were 351,071 tonnes of carbon dioxide equivalent (Melbourne Water, 2010). Additionally, the recently constructed desalination plant with a capacity to deliver up to 150 GL a year, would consume 2,160 MWh/day of energy and produced 1.4 Mt of CO<sub>2</sub> emissions during construction with additional estimated 1.2 Mt CO<sub>2</sub>/year. For most cities, new sources of water such as desalination, recycled water and rainwater tanks have greater energy intensity than the traditional sources (Hightower and Pierce, 2008).

Recently increased concern about climate change and the need for GHG mitigation options focused attention on water related energy use and its GHG implications. Therefore, having the capacity to quantify energy and carbon emissions associated with the entire water cycle is critical to assist in planning for the adoption of a strategic approach towards water supply and discharge. It's important to ensure true energy neutrality of water supply strategies. In recent years, significant efforts have been made to reduce water consumption and GHG emissions. These efforts, however, have largely been carried out separately on water resource management and GHG emissions, and the coherence is generally not reflected while planning and managing the water and energy resource due to lack of tools capable of analyzing the nexus between water supply and energy/GHG in an integrated way. Wilkinson, 2007 studied the energy usage for urban water supply. But the study did not focus on GHG implications and possible solutions. Lundie et al., 2004 evaluated the water and wastewater services projected for 2021 in Sydney and concluded that demand management and energy efficiency provide the best opportunities in terms of water and energy savings. Kenway et al., 2008a, studied the energy usage in provision and consumption of urban water in Australian and New Zealand cities at the system level, object level and total urban energy use. The study provided a first estimate of energy use for water provision in Australia, but does not offer an in depth understanding of the interactions between the water and energy use and GHG emissions under various scenarios. Detailed assessment and understanding of the Water-Energy-GHG nexus is crucial to enable the water and energy systems to understand where gains can be made more effectively (Rocheta and Peirson, 2011) and to ensure that the adaptation strategies in urban water supply systems do not pose exacerbate climate change.

This understanding is crucial to facilitate the achievement of optimum climate change adaptation of water and energy systems through the selection and evaluation of alternative strategies by enabling the comparative analysis of various strategic options in terms of water availability, water quality, energy use and GHG emissions associated with water provision. This study recommends the development of the necessary evaluation tools needed to enable the implementation of such an assessment framework. The tool can become comprehensive industry standard with appropriate modelling capability for quantifying the energy consumption and its impact on GHG emissions of any proposed new urban water supply strategies.

## **Conclusions**

Traditionally, the domestic water services have often failed to address the multiple water demand for multiple purposes like drinking, toilet flushing, cloth washing and irrigation. The water supply has typically focused on single-use services which is not sustainable with ever increasing demand for water. There is a need to utilize the huge potential nested in rainwater harvesting and wastewater reuse and recycling and to understand the energy intensity of each option to find the most suitable infrastructure option for water provision in decentralized manner. Therefore, there is a need to develop a comprehensive accounting framework for combined evaluation of water flows, energy use and GHG emissions to identify opportunities for cost effective efficiency gains in terms of water, energy and emissions savings.

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## **Urban planning and fire design. Should communities protect themselves against the spread of fire from neighbours?**

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## **INTRODUCTION:**

The theme of this conference is 'Resilience'. Resilient Cities protect and enhance their urban resources while managing the impact of climate change and population growth.

One of the impacts of climate change is the increased prevalence of fires.

My paper deals with this 'part' of climate change and what impact this aspect has on the design of our cities.

My conclusion is that we are not dealing with this aspect very well, and it seems to be a forgotten subject when it comes to discussing and undertaking urban design. It's time to take stock and deal with the problem.

Much of my research in recent years has dealt with the improvement fire design and the development of fire-safe buildings. There are significant ramifications of this work which relate to the design of our cities as well.

My paper will deal with new possibilities for both urban and rural areas in accommodating the damaging effects of bushfires. I will use a case study, being a display Fire Station, which demonstrates how we can design for these events and improve the sustainability and safety of our cities and rural infrastructure accordingly.

## **PART 1: COVENTRATED**

The word 'Coventrated' is a buzzword of the English language. It did not exist on the 14th November 1940. It did, however, come into existence one day later.

On the evening of November 14th, 1940, the German Luftwaffe staged a bombing raid on the English city of Coventry. Coventry was an attractive target to the Germans, being the site of a number of key British munitions factories. They had bombed the city before but this time it was different. The following are recollections of the events of that evening:

- The moon began to rise over Coventry at 5.18 pm.. Everyone would later recall its extraordinary brightness. It gleamed on the cobbles of the old city and the lead roof of the cathedral. The sight made people nervous. The citizens had come to fear a bomber's moon. At 7.10 pm the sirens sounded. This was early for a raid to be announced and the apprehension deepened. Ten minutes later the Germans were overhead and the bombardment began. It started with small incendiaries. They make a curious swishing noise as they fell. ....
- .They came down in huge numbers and the emergency services and volunteer firewatchers were soon overwhelmed. At 9.31 p.m. the first high explosive (HE) bombs hit the ground. A firewatcher's log recorded at 9.40 p.m. 'Cathedral blazing fiercely.' .....

By midnight, Coventry's defences were overwhelmed, and the city was ablaze – German bombers who participated in the raid would later speak about the lake of fire they saw beneath them, while the city's own fire fighters spoke in despair about how they simply could not control the inferno.

The all-clear sounded at 6.16 am (next day), eleven hours after the first warning. Few heard it.

To that date, the use of explosive devices by the Germans had not created widespread devastation. This time was different. They used fire.

Coventry had been hit by 503 tons of high explosive, 56 tons of incendiaries and 127 parachute mines. The combination of high explosives together with the incendiaries effectively scattered the incendiaries in all directions starting fires wherever they landed.

What happened that night in Coventry is understood to be the first example of a man-made fire storm. Technically it was a new invention. Many cities had been burned before by fire and many had been started by man, but this was the first time man had harnessed the power of fire storm to effectively destroy a city, and all in just 11 hours.

As well as widespread devastation of the commercial and industrial areas of Coventry, 42,904 houses, consisting of more than half of the city's houses, were destroyed. It was not the explosions that caused this devastation, but the intense ferocity of the fires that spread through the city.

Of course, not all fires are man-made, but if the destruction of Coventry that night in 1940 teaches us anything, it's that safe, sustainable and resilient urban planning is vital to mitigate the effects of such disasters.

Lessons that can be learned from this example are:

- The containment of fire from one property to another is vital to the survival of the whole of a city.
- The fire rating standards of each building has a direct relationship with the fire rating performance of the entire city.
- The material and construction of the roofs of most of the city effectively made the city vulnerable despite the predominate use of masonry wall construction for the walls.
- If the buildings were constructed of non combustible materials and design, the city would not have been devastated.

## **PART 2: DENIAL IS NOT A RIVER IN EGYPT**

For many years Australians have ignored the effects of fires in urban planning and building design. Despite this, Australia's worst three bush fire 'disasters' have occurred in the last ten years.

Despite the repeated warnings signs for many years we are still living in denial by continuously building cities which are vulnerable to devastation by fire. I suggest we may well be the 'lucky country' but we can't trade on our luck for too long.

A definition of stupidity is doing the same thing and expecting a different result. For as many years as I can remember, people have been building houses in the Dandenong Ranges in Victoria, being burnt out, and rebuilding the same or similar buildings in the same place. There are a new building standards for these areas, but why has it taken a recent disaster to prompt people to act and why



historically have we ignored the repeated warnings in a country where fire is a natural and recurring event?

Some of Australia's worst recorded fires have occurred in the last 10 years. These include:

- 2009 Black Saturday Fires, Victorian Bush Fires, 7th Feb, 2009: Australia's worst bush fire in the nation's history. 173 people killed, over 5000 people injured, 2,029 homes destroyed, and 4,500 sq.km forest burnt.
- 2003 The Canberra urban fires, Jan 8<sup>th</sup> 2003: Australia's second most expensive fire. 4 people died, 470 homes destroyed, 2000 businesses damaged, and repair bill \$450 million.
- 2011 Black Sunday Fires, Perth, 5th Feb 2011: no loss of life, 72 homes destroyed, 32 more damaged.

(Note: Prior to the last 10 years, The Ash Wednesday Fires of Victoria and South Australia, in 1983, caused the death of 75 people.)

If we include recent international fire reports in only the last 2 weeks, they include the following:

- 2011-from the 6/9/2011, Texas Fires: 3.5 million acres of state forest destroyed, over 1000 homes destroyed, over 600 homes destroyed around one town, Bastrop. The fire was 'whipped' into an inferno by tropical storm Lee's winds. Death toll 4 at least, and thousands of people evacuated.
- 2011-Canberra Chemical Fires, Australia, 17/9/2011: Fire broke out in an Industrial Estate of Mitchell, suburb evacuations, Fire took 22 hours to bring under control.

From the above brief lists of fires referred, it is noted:

- Both the Canberra Fires, the Perth fire and the Texas fires damaged extensive urban areas and not just bushland areas
- The large proportions of homes destroyed in these fires were in urban areas.
- Extensive and devastating damage by 'bush fires' worldwide is not an uncommon event.

It can also be seen that Australia's preparedness for these events should go beyond simply improving the standard of homes in bush land areas alone. We should be improving the standards of our urban areas as well.

Despite the recent history of devastating fires referred above, Australia is still largely unprepared to withstand these events occurring in our urban and rural areas. This is most likely because it is commercially cheaper to 'insure' the risk than it is to mitigate the risk by design.

The more worrying aspect of our dependence on 'insurance' is that it is not only individuals who are avoiding the problem by relying on insurance policies, it is governments as well.

These pieces of paper are of no tangible benefit when we have to face devastation by fire. Should one of our cities be 'Coventrated' by either a manmade or natural event, then it is unlikely the insurance companies will exist let alone be in a position to replace what has been lost. This is cold

comfort to governments and individuals who have relied on the 'insurance panacea' to solve the problem.

The value of 'insurance' is to spread the financial risk. Individually this is a useful feature available in our society but collectively (e.g. governments) we should be investing in practical ways of solving the problem in the first place rather than simply trying to mitigate the financial risk to others.

Our community needs to face up to these challenges or face the consequences of inaction. Managing Emergencies requires skill and commitment from many different parties. It requires input from urban planners as well. These principals are perhaps better and more fully described in Jackson's "Managing Emergences- Guidelines for Emergency planning". (Refer bibliography)

The reason for raising these issues in this section is because it is the urban planners who must take the key role in making this change. Architects may provide technical individual solutions but it requires a collective effort by the urban planners and town councils to effect this change and raise our preparedness for the extreme events. We should be focusing on ensuring that new buildings do not permit the spread of fire to neighbours and that they are constructed in such a way that they will withstand fire attack from outside the building. There are also many benefits to ensure they are protected from inside exposure as well.

This requires a different approach to the design of buildings. It goes beyond simply meeting present building act requirements (ref BCA). It is also of little use unless collectively we all adopt this higher standard of design. The benefits, however, are far reaching. We will be going a long way towards 'Future proofing' our cities for the next generation whilst protecting our own.

With this theoretical background in mind, Cox Architects set out to design a practical construction system which would satisfy these requirements and hopefully lead the way to solving at least some of these problems.

### **PART 3: RESEARCH PROJECT- Xanthorrhoea 1 -FIRE STATION.**

'Xanthorrhoea 1' is a research project undertaken by Cox Architects to examine and develop primarily new construction systems suitable for building in bush fire prone areas. This project culminated in the construction of a full size prototype building.

The theoretical aspects of the study, which commenced in 2005, confirmed that it was not sustainable to continue to build in standard construction techniques in these areas because the buildings constantly failed. There was a vast waste of resources and a serious threat to life to continue to do so. It was also found there was not a construction system available which could withstand the full effects of bushfires. To overcome this problem, this new construction system was developed.

The system used in constructing the prototype building was patented prior to the Victorian Bush Fires of February 2009 and the prototype was largely completed by then. This research anticipated Australia's vulnerability to such an event occurring.

The building is designed for the most hazardous category of bush fire attack. It has been independently assessed to meet this standard and has the potential to exceed the same. The construction system offers improvements in overcoming other broader effects of global change by providing a high resistance to cyclones and floods. Other benefits include low maintenance, high thermal insulation, high durability, and high security. The combined effect of some of these advantages reduces energy consumption.

A unique feature of the system is the integration of the roof and walls. Rather than fixing the insulation under the roof, this system forms a structural fire insulating shell over the building which is integral with the walls. This makes the roof far stronger than standard. The protective layer is like icing on a wedding cake in that it covers and protects the entire cake.

The windows are protected by patented fire resisting awnings which are part of the construction system. They offer a range of other benefits including reducing energy consumption. The building is solar powered and requires minimal energy consumption. The services are independent as necessary in remote rural locations. The construction system demonstrates that it is suitable for a range of different small building types such as Fire Stations, Police Stations, Schools and other civic buildings. In rural areas especially, these community buildings play a very important role by providing shelter and acting as communication centres in times of crisis.

By 'Raising the bar' in regards the durability and performance of our buildings, they will last longer, require far less maintenance, and provide better shelter against the increasingly unpredictable effects of climate change. In doing so, they will be more sustainable than current standard construction methods. This project tries to achieve this and to lead the industry towards building assets in the future, not liabilities. It also proves that you can build responsibly in bush fire prone areas.

#### **PART 4: BUILDING ELEMENTS -ROOFS.**

In the research project above, it was found necessary to invent many different items and methods of construction in order to produce a building envelope that would sustain the full effect of a bush fire attack. The reason that each of these individual items is so important is because should one item fail, then the whole of the protection system could fail. Essentially a chain is as strong as its weakest link.

There is not sufficient time to discuss the research into each element of the research project but if I was given the opportunity of improving only one item in the effort to improve the fire resistance of the average residential or small commercial Australian building, then it would be the roof. This is because it was found that it was the roof design inadequacies which caused the major breaches of the fires investigated.

It should be noted that for a single storied average Australian residence that:

- The majority of surface area of a building envelope is the roof.
- The roof has no fire rating protection at all.
- The junction with the walls is often the fire entry point of the building.
- With regard to fire resistance, the roof is the weak point of the building.

In consequence to the above, and the investigation of the effect of fires around buildings, it was clearly necessary to design new methods of protecting the roof element as this element was going to be critical to the whole project.

The final result was a system that achieved a very high fire resistance against external bushfire attack. One part of same alone achieved a rating of '3' hours. The complete system should be considerably more than this. It is understood that this very high rating has not been achieved by a roofing system before. (For more detailed description of FLR'S refer appendix).

The relevance of this item is that should we raise the fire resistance performance of all roofs used in a city to this standard, then this change in itself would dramatically improve the preparedness of the whole city against fire and other extreme events. It is also reasonable to make the assumption that should this technology have been available and used in Coventry in 1940, then the word 'Coventrated' may not have existed.

#### **PART 5:            URBAN PLANNING- USES OF THIS TECHNOLOGY.**

There is a myriad of ways this new technology can be used in urban planning to help protect our cities and urban infrastructure from the devastation by fire or fire storms themselves. This paper highlights to availability of this new technology in response to the need already discussed. The implementation of the same is another exercise.

However, to demonstrate applications of this technology in urban planning and different building uses, the following are three conceptual examples of the same:

##### **A)            Urban Planning-    City    -'The Brisbane Line':**

I have called this planning concept of mine 'The Brisbane Line' which has historic connotations. The concept could be used in many cities around Australia and elsewhere.

It is obviously very difficult to implement these new standards of design into the whole of an existing urban fabric. For economic reasons the adoption of these new standards may not be feasible in very low density housing areas commonly described as 'urban sprawl'.

However, new low and medium density housing and commercial buildings are well suited to the adoption of this technology. If these buildings are upgraded with this technology, then they could act as 'walls' of built form that could serve as buffers around the central business zones thereby providing additional protection to the latter. The 'walls' I have termed the 'Brisbane Line'. (Refer to the attached sketch which describes the same).

##### **B)            Urban Planning-            Rural:**

There are many areas of rural land surrounding cities in Australia which have been deemed by local councils as being unsuitable for housing and other building uses because of the high fire danger

posed by bush fires. Using current building practices this restriction is quite understandable and responsible.

Using the technology described in this paper, however, it is feasible to build in these areas providing other infrastructure such as safe road access etc is provided. Obviously councils will need to engage with the local fire authorities in the formulation of the building control requirements.

#### C) Urban Planning- Building Uses:

There are many building types that could benefit from the use this technology. They include:

- Civic buildings in rural areas that can act as shelters in extreme weather events. (e.g. schools, local halls etc)
- Civic buildings in urban areas that require better protection against urban fires. (e.g. court houses, council chambers, schools, etc)
- Police stations, fire stations, railway stations and municipal service buildings
- Auditoriums and theatres of high public use.

### **PART 6: WHAT DO WE LEAVE BEHIND?**

Whilst many believe that every new suburb developed and every new high rise apartment building constructed in our county is a sign of progress and prosperity, I raise the question that this may not be the case.

My concern is that if buildings are not sustainable, then building them is not making progress. We are more likely simply creating yet another liability for our future generations to endure. Hence I suggest by investing in making our cities more durable and sustainable and making them in a way which they will be able to sustain extreme climatic events including fire attack, we will be 'future proofing' our cities for the next generation. In this way we will be providing them with assets in the future and not liabilities. Also, with the reduction and resources and energy use, it looks like they are going to need whatever assets we can give them.

### **PART 7: APPENDIX**

#### **FIRE RESISTANCE LEVELS:**

The Building Code of Australia (BCA) requires buildings to comply with a Fire Resistance Level (FRL).

The BCA defines a FRL as the grading period in minutes for three criteria: structural adequacy, integrity and insulation:

- Structural adequacy refers to the ability of a structure to maintain its stability and load bearing capacity
- Integrity means the ability of a structure to resist the passage of flames and hot gases
- Insulation is the ability of a structure to maintain a temperature below specified limits on the surface not exposed to fire.

An FRL requirement for a wall of 90/90/90 would mean that the wall must maintain structural adequacy for 90 minutes, integrity for 90 minutes and insulation for 90 minutes, as tested to Australian Standard 1530.4-1990: 'Methods for fire tests on building materials, components and structures-Fire resistance tests of elements of building construction'.

Buildings that are required to have fire-rated components can use certified wall, floor and ceiling systems that have been tested to the above standard.

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## **PART 9: ABSTRACT**

**ABSTRACT:** International Urban Design Conference- Resilience in Urban Design- 2011:

For many years Australians have ignored the effects of fires in urban planning and building design. Despite this, Australia's worst three bush fire 'disasters' have occurred in the last ten years. It's time to take stock and deal with the problem.

My talk will deal with new possibilities for both urban and rural areas in accommodating the damaging effects of bushfires. I will use a case study, being a display Fire Station, which demonstrates how we can design for these events and improve the sustainability and safety of our cities and rural infrastructure accordingly.

The Fire Station is the result of a research project undertaken by our firm to examine and develop new construction systems suitable for building in bush fire prone areas. The project culminated in the construction of this full size prototype.

The theoretical aspects of the study, which commenced in 2005, confirmed it was not sustainable to continue to build in standard construction techniques in these areas because the buildings constantly failed. To overcome this problem, this new construction system was developed.

The construction system demonstrates that it is suitable for a range of different small building types such as Fire Stations, Police Stations, schools, and other buildings including housing. Community

buildings, especially in rural areas, play a very important role by providing shelter and acting as communication centres in times of crisis.

By 'raising the bar' in regards the durability and performance of our buildings, they will last longer and provide better shelter against the increasingly unpredictable effects of climate change. In doing so, they will be more sustainable than current standard construction methods. This project tries to achieve this and to lead the industry towards building assets in the future, not liabilities. It also proves that you can build responsibly in bush fire prone areas.

# **The Winter climate and non motorised travel modes – a case study in Kiruna, Sweden**

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## **Abstract**

*The paper presents part of the results from a survey study, in Kiruna, Sweden's northernmost town. The focus of the study was on travel pattern in towns with sub-arctic climate. The findings of the survey showed that inhabitants of Kiruna travelled more with car compared to other Swedish towns with similar population while public transport, walking and cycling held very small shares of the total travels. Regarding effect of the sub-arctic climate on transport mode, the majority of respondents considered slipperiness, wind and precipitation to have the most negative effect on both walking and cycling. The findings suggested the importance of climate factors to be emphasised in traffic planning in the sub-arctic regions.*

**Keywords:** Sustainable transport,

## **Introduction**

The aim of this paper is to explore the travel pattern and attitudes towards non motorised transport modes among the inhabitants of the town of Kiruna. Kiruna, located above the Arctic Circle in the Swedish Lapland is going through a profound urban transformation as a large part of the town including the centre has to be relocated and rebuilt. This is due to the land deformation caused by the iron ore mining in the immediate vicinity of the town. According to the last official decision, the new town centre including housing areas, commercial buildings and public services will be located 3 kilometres to the eastside of the present town centre (Kiruna kommun, 2011). Given this extraordinary situation, Luleå University of Technology, Sweden, has initiated number of research projects to support the ongoing planning process. One of the projects which is partially presented here, concerns about physical and traffic planning in harsh cold climate. As a part of problem identification, a survey was conducted to inquiry about the socioeconomic background, travel pattern and attitudes towards different travel modes in the sub-arctic context.

In regions with harsh climate, the seasonal climate factors have strong effect on every aspect of the urban life including transportation. Our review of the literature on climate and travel pattern met very few results, compared to the large body of the literature on urban travel pattern. On this basis, to carry out the travel survey in Kiruna, some sections were specifically tailored to scrutinize the effects of sub-arctic climate elements on non-motorized travel modes, namely, walking and cycling.

## **Background**

Kiruna is Sweden's northernmost town that inhabits nearly 18000 people. The identity of Kiruna is intertwined with the sub-arctic climate. This climate is characterized by long

winters that last 7 to 8 months. During the winter, the temperature remains constantly under zero degree Celsius between November and March. Number of days with snow cover exceeds 200 days per year. Such climatic conditions make Kiruna distinguished from many other Swedish towns.

One of the prime concerns for the future of Kiruna is to alter the current traffic pattern. Today, the public transport holds a very small share of total personal transport in the town. Car is the dominant transport mode both for work and non-work trips. Public transport in Kiruna is based on the bus system. (Kiruna Kummon, 2011a)

### **The objectives and questions of the study**

The objective of conducting this questionnaire study has been to obtain an overall picture of the travel pattern in Kiruna as well as understanding what factors play significant role in preferring car over other transport modes. In addition, we aimed to measure the effects of local climate elements such as snow, ice and low temperature on walking and cycling. In line with the objectives of study, following questions are raised.

- What is the share of different travel modes for the trips made by Kiruna inhabitants?
- Do pedestrians and cyclists perceive local climate factors differently?
- What is the effect of different local climate factor on pedestrians and cyclists?
- How can non-motorized travel modes be supported in the future traffic strategy considering seasonal climate factors?

### **Data**

The paper is based on the information obtained via a mail survey which was carried out in April and May 2011. The questionnaires involved circa 1500 of the inhabitants. The sample population was composed of 1250 of adults (20 to 74 years old) and 250 teenagers (15 to 19 years old). The questionnaire included two main sections. The first section comprised questions on socio-economic backgrounds, the respondent's attitudes toward different travel modes and the impact of some of the climate factors on non motorized travel modes. The second section was a travel diary to be filled on certain dates. The dates for travel diary were equally distributed among the week days. The dates for filling in the travel dairy were in April and May so as inhabitants would be able to experience winter weather conditions while completing the survey. We received totally 516 correctly answered questionnaires which corresponded to nearly 35 per cent of the whole sample population.

## Descriptive analysis of the responses

Some of the socio-economic information resulted from the survey is presented in the table 1. The average age of the respondents is 48.35 which is one year older than the average age of the whole town population in age between 15 to 74. According to survey, there is 1.4 car per household in Kiruna while this number declines to approximately one car per household for the entire Sweden (SIKA, 2007).

**Table 1. Some of the socio-economic factors resulted from the survey in Kiruna**

Number of respondents	Average House-hold size	Car per house-holds	Average age	Respondents gender division (%)		Residence type (%)		
				Women	men	Detached house	Terra-ced house	Multi-family house
514	2,79	1,42	48,35	50,4	49,3	44,2	9,1	41,8

The latest national travel survey in Sweden (RES 2005-2006) shows that travel pattern in the sparsely populated municipalities differs in various aspects from the large towns and cities (SIKA, 2007). To achieve a sensible comparison, the results from the survey in Kiruna are compared to the travel pattern information of the municipalities with the population between 12500 to 25000 obtained from RES 2005-2006. In all of these municipalities including Kiruna, the public transport is based on the bus system. Table 2 includes information on the shares of the five main travel modes of the aforementioned municipalities (labelled as “low populated municipalities”) and Kiruna on the day of survey.

**Table 2. Travel pattern in Sweden (low populated municipalities) and Kiruna**

Percentage of each travel mode on day of the survey	Low populated municipalities	Car as driver	Car as passenger	Bus	Bicycle	By foot
		47,14	14,81	4,22	9,51	24,32
	Kiruna	65,93	12,30	1,04	1,35	18,13

Looking at the ratio of each travel mode, the ratio of the „car as driver“ trips includes 47 per cent of all trips in this group of municipalities. In Kiruna, the same trip mode accounts for nearly 67 per cent of the average weekdays travels. On the other hand, the shares of other travel modes are smaller in Kiruna. In particular, public transport (Bus) and bicycle hold a very small share of daily trips. We should somehow note that,

this survey was carried out during the winter time, while the information of the other municipalities is representative of the four quarters of year.

### **Impact of climate factors on the choice of walking and cycling**

The respondents were asked to determine the extent to which the given climate factors (sun, low temperature, precipitation, slipperiness, wind and darkness) would influence their choice of travel mode if they had considered travelling by foot or bicycle during the winter season. They could rate between 1 (very negative) to 5 (very positive) in a five steps rating scale with the option to choose “unable to rate”. Table 3 includes a summary of the responses.

**Table 3. The perceived impact of winter climate factors on walking and cycling**

		n	1: Very negative (%)	2: Fairly negative (%)	3: Neutral (%)	4: Fairly positive (%)	5: Very positive (%)	Median
Low temperature	By foot	464	15.5	27.1	35.7	11.8	9.6	3
	Bicycle	272	47.4	20.6	22.1	5.1	4.8	1
Wind	By foot	466	27.0	39.9	29.1	2.7	1.0	2
	Bicycle	276	52.9	25.4	20.3	0.7	0.7	1
Slipperiness	By foot	474	34.6	36.5	26.4	1.9	0.6	2
	Bicycle	279	68.8	17.6	11.8	0.7	1.1	1
darkness	By foot	461	9.5	16.6	64.4	6.7	2.8	3
	bicycle	274	31.4	16.1	47.8	2.9	1.8	3
Precipitation	By foot	465	22.6	42.2	30.3	3.4	1.5	2
	bicycle	276	60.5	23.2	14.9	0.4	1.1	2
Sun	By foot	474	0.8	0.4	10.3	17.7	70.7	5
	bicycle	274	8.4	1.1	15.7	23.7	51.1	5

We noticed that the number of „unable to rate” answers and the non-response cases is much higher among the answers to the questions on cycling. For the questions on cycling, the ratio of “unable to rate” answers ranges between 34,6 to 36 per cent across the six factors and the ratio of the non-response answers varies between 10.7 to 12.3 per cent. When it comes to walking the highest percentages of “unable to answer” and non-response answers are respectively 3,7 and 5.8. In the table 3, the valid ratios of various answers are presented which are the share of each scale when the non-response answers and “unable to rate” ones were not included in the calculation. Unsurprisingly, among the 6 factors, the impact of sun showed an opposite trend to the others. In both cycling and walking, sun has received most positive responses. In particular, concerning walking, more than 70.7 per cent of the respondents, have

assessed effect of sun as „very positive“ on the choice of walking. Between the five other factors, slipperiness has been assessed with the most „very negative“ answers by 34.6 per cent for walking and 68.8 per cent for cycling. We notice that for the five factors, the percentage of very negative answers is remarkably higher for cycling than for walking. About walking, more respondents have chosen to answer fairly negative or neutral for the all factors except the sun. This tendency is also reflected on the median values associated with those factors. For both walking and cycling, darkness has been assessed as “neutral” by a large part of the respondents.

## **Discussion**

Compared with the other Swedish municipalities with similar population, the study portrays Kiruna with larger share of car travels and smaller shares of public transport, cycling and walking. From the survey, we learned also that 64 per cent of respondents are employed which among them, 52 per cent lived in less than 3 km distance to their work place which highlights the potential of transferring part of the car trips to bicycle and walking. Regarding perceived effect of climate factors, respondents have ranked slipperiness, snow, rain and low temperature with most negative effect on the choice of walking and cycling. Not unexpected in the Swedish context, sun has been stated by majority of the respondents as having “very positive” effect both on choice to walk and cycle. We observed a clear response rate difference between cycling and walking. Not only that very few of respondents have use bicycle for daily transport (1,35 per cent of daily trips is by bicycle) but also on the effect of climate on the cycling, many answered with „unable to rate“ choice or left the questions without any answer.

Interestingly, the effect of weather on walking is assumed to be smaller than previously understood. There is definitely an effect of extreme weather conditions such as high winds or rain, snow, thunder, heat, etc., but not on walking on an average day according to Sauter et.al. (2008). For leisure travel and sojourning at public places, the weather, however, is crucial. It is somehow not in disagreement with results of the survey which suggest that the harsh climate conditions are perceived to have important effect on walking and cycling.

Dealing with climatic factors is challenging though. Despite the expressed enthusiasm for climate sensitive design, urban climate knowledge has a low impact in planning in Sweden (Elliason 2000). Principals of climatic design are difficult to use for urban and traffic planners and they become often subordinated during the complex and long decision making processes.

## **Conclusion – attention to climate factors**

The higher interest in walking than cycling as indicated in travel pattern and attitude questions, underscore the potential of walking in the future traffic strategy of Kiruna. The results show also that winter climate factors have larger negative impact on choice of cycling. Nevertheless, cycling should not be neglected in the future traffic strategy as its share in overall travel pattern changes during different periods of the year. Therefore, we will conduct another travel survey in Kiruna in September 2011 in order to achieve a broader picture of the relation between seasonal climate factors and travel pattern. Findings of the opinion survey highlight the following issues that can serve as baselines for climate consideration in transport planning for harsh cold climate.

- In the context of sub-arctic climate, a clear strategy prioritizes climate principals at different planning stages.
- Sun access for sidewalks and pedestrian routes should be considered under various planning phases.
- With the negative attitude about slipperiness it is of great importance that winter road maintenance for sidewalks and bicycle routes is prioritized.
- Wind and snow drift: Simulation of wind and snowdrift can support planning at macro and micro scale with the aim to more efficient use of outdoor public spaces as well as easier maintenance of roads and sidewalks.

However, structural aspects and socio-economic factors should be further analysed to ensure the results.

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# **Lines of Motion:**

## Scales of Architecture

### Transcend the Divide between Design & Planning

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## Abstract

This paper explores the artificial border between design and planning. 20th century architects recognised this disciplinary obstruction and now second millennium designers need to consider this so they can build complex cities successfully. Design and planning professions need to reconcile their roles, if their practitioners intend to reform dysfunctional cities.

Sydney's transport infrastructure is dysfunctional. Indecision within government and blurred roles among numerous professions have prevented metropolitan infrastructure from keeping pace with demand. At the heart of this issue is lack of perception across scales of space. With no overall master plan, indistinct professions and vested interests in public-private-partnerships - the vision is lost.

Lessons from Sydney's 2000 Olympics provide one framework to reconcile design and planning disciplines. Throughout all Olympic preparations, Government coordinated both planning and design - so original visionaries remained in control of the vision. Olympic methodology was a top-down concept created by government, with implementation by the commercial sector as bottom-up effort. Government issued specifications while others (architects and planners) responded with innovative designs.

*Lines of Motion* is a concept that looks beyond an individual site or one viewpoint (design or planning) and envisages architecture for a whole city. For transport, *Lines of Motion* transverses all scales of the „Cities of Cities“. The scales range from transport network scale, urban space scale, through to train-station scale. A scenario is Observatory Park Station. In 2010, the author studied the metropolitan transport network and realised the need for a second CBD interchange and a new train line to connect Barangaroo with Circular Quay along a *Greater City Circle*. Further study showed Observatory Park as the pivotal site at train-station scale. Iteration and inter-relationships across three scales of architecture combine planning and design. The resulting „architecture“ of the interchange building encompasses design, location and city-wide need for transport itself.

## Keywords

Transport, Architecture, Urban Design, Planning, Vision, Design, Sustainability

## **Scales of Architecture: A Vision**

The first professional degree in *urban design* was established at Harvard University in 1956. (Harvard Library 2011). Jose Lluís Sert started a variety of innovations in the architecture curriculum because he was an architect who could perceive the void 'between the architecture of individual buildings and the architecture of the city' (Peter 1994). His answer was to teach *urban design* as a new discipline.

Sert's course tried to fill a gap that had formed between the design of buildings (architecture) and the design of cities (urban planning). He tackled the neglected 'heterogeneous, interlocking, overlapping, sometimes-competing networks' of social engagement in urban spaces where happenstance encounters can cement a community and sometimes foster pluralism (Goldhage 2005). Sert believed that rationalist urbanism had neglected dimensions of urban life that were just as critical to cities as hygiene and efficiency. Modern cities were ignoring the way that people interact, use space and relate philosophically to space in their lives in the street, neighbourhood and monuments of a city (Goldhage 2005).

The essence of what Sert identified was a sensitivity - of lack of it - to human proportions in urban design and he understood the importance of scale in architecture. Sert said: "We design things that look very well as models, or blown down to magazine-page size, but very bad when blown up to full size." (Zucker 1944)..... "At the time I began to talk about these matters . . . people were absolutely unconcerned. The architects thought it was none of their business. The planners were just not interested in that kind of physical world." (Peter 1994)

In terms of modern history, this significant rebuff to rationalist urbanisation is a quite recent occurrence, within the lifetime of many current planners, architects and specialists. It was one reaction against technocratic planning and the emergence of sprawl in the 20th century. In retrospect, reasons why city planning around the world became progressively insensitive to the scale of human proportions are understandable. After 1945, cities expanded in area to cope with a bulging post-war population. An by 2008, cities were housing half the world's population, due to mass migration from the countryside.

## **Scales of Architecture: Sydney 2000 Olympic Games**

Australia's chance to showcase good urban design came in the middle of this unfolding turmoil of overpopulation and ad hoc planning when the NSW State Government, Australia, bid Sydney as the host city for the 2000 Olympic Games. Apart from usual motives such as civic pride and tourism, this bid was a chance to challenge the uncoordinated, rationalist way of approaching urban planning that had entrenched itself in most cities around the world. Also there was the impetus of wanting to leave a legacy to future planners, architects and the construction industry for a new millennium. The NSW Government realised that the legacy could be unique because for the first time, the International Olympic Committee (IOC) requested that its bidder cities deliver a *green games* at a summer Olympics. This was Sydney's opportunity to combine architecture and city planning and showcase sustainability and integrated *urban design*.

Fortunately, due to the need for Sydney to capture votes to win the right to host the 2000 Olympic Games, officials and promoters were forced to work in a coordinated manner from the outset. Just as importantly, the bid was based on the principles of sustainable development. The idea of sustainability combined environmental–social–economic ideology and was relatively new at this time. Sustainability planted its concept in the public consciousness in 1983, when the Secretary-General of the United Nations established the World Commission on the Environment and Development - also known as the Brundtland Commission. So it was a mere ten years later, in 1993, that the Sydney Bid Committee developed the *Environmental Guidelines for the Summer Olympic Games* - based on sustainability - as part of its IOC application.

Then Sydney won the Games. The first step for the NSW Government was to build its legal framework and it established the agency, the Olympic Co-ordination Authority (OCA) in June 1995 with the *Olympic Co-ordination Authority Act 1995*. This was supported with the *State Environmental Planning Policy No 38 - Olympic Games and related projects*. A Master Plan soon followed and the promise of sustainability got under way. The Master Plan foreshadowed an integrated design across both urban space and landscaped space to create a sporting precinct around a new railway station at Homebush. The main element was an 'Olympic Boulevard' cutting an axis through the Olympic precinct from north to south. This spine provided a focus for public circulation and public transport. By incorporating the existing Bicentennial Park into a network of parklands around the core site, a major new park of 450 hectares became possible. This promised to be, for western Sydney, what Centennial Park is to the eastern suburbs. The Master Plan was the basis for a shift from the pragmatic to the interpretative and facilitated new overlays of public art and enhanced public space. It provided a robust basis for the future of a site that might serve multiple agendas (Maher 2000).

As a location, Homebush had a head-start because it already had the ambiance of Bicentennial Park. However there was a challenging constraint. Sydney's 2000 Olympic Games were intended to concentrate the largest number of purpose-built stadia ever built for an Olympics, and 90 percent were within one area at the geographic centre of metropolitan Sydney (Bingham-Hall 1999). Ironically this convenient supply of vacant space in such a central location was only possible because of past planning mistakes. The location had been a dump site for more than thirty years and contained pockets of contaminated landfill around the precinct which had blighted previously attempted projects. So implementation of a successful Olympics necessitated

very high quality conceptualisation and planning across nearly every discipline of design, engineering and science.

OCA worked with the Government's waste agency - WasteNSW - to clean-up the soil contamination at the Olympic precinct and made the space ready for an Olympic grade sports hub. From the government's viewpoint, this remediation effort, while expensive, transformed a wasteland from a liability to an asset and provided a building site that was safe and suitable for Olympic construction to begin.

However the extent of the *green games* could not be confined to projects on the precinct. Sustainable development includes the way people travel to and from buildings and venues. So OCA committed to make the Olympic venues accessible by public transport - including from the international airport. The step to achieve this ambition was establishment of a new agency, the Olympic Rail Transport Authority (ORTA). This new, specific-purpose agency completed the Olympic Park Railway Station and its rail loop in 1997. A 'test run' was trialled during the inaugural Homebush Royal Easter Show held on the precinct in 1997. More than one million visitors arrived by public transport during show-time. When put to the 'real test' during September 2000, the ORTA-designed transport system carried up to 50,000 people per hour during the Olympic Games.

While the environmental aspect was obvious, OCA also realised it needed to include the social aspect of sustainability in its urban design and planning from the beginning. It worked with other sectors of industry and conducted community liaison to ensure that delivery of innovative facilities and services had the inclusion and support of relevant parties. Although OCA had a small staff which usually numbered about 300 officials, its functions were: Developer; Co-ordinator; Asset Manager; and Budget Monitor.

Such a grand scope of work was feasible because the NSW Government did not expect OCA to manage the staging of the Olympic Games itself. OCA was an urban design agency of government and in the words of (then) Minister for the Olympics, Michael Knight: “.... OCA builds the theatre, SOCOG puts on the show”.

So OCA kept its focus on land clean-up, design, construction and expected maintenance of the sporting arenas and other venues needed to accommodate the Games. With sustainability as its guiding principle, OCA established several specific sustainability plans, including: Technical Guidelines; the Environmental Tender Specification; an Environmental Management System; numerous Environmental Management Plans; and community consultation. Guidelines and specifications required tenderers to provide evidence of their company's environmental policy, management systems, due diligence with environmental legislation, and past environmental performance. This detailed level of control and planning was conducted before the tendering process, so it enabled most of the on-the-ground work to be specified and contracted to the commercial sector. OCA's planning and comprehensive procurement management system gave the Government confidence that sundry companies – big and small – could align their efforts to the Government's objectives.

So the goals and concept design for the Olympic precinct was a top-down process by a government agency that used a bottom-up implementation by and with industry practitioners. In a coherent manner, Government set the criteria and challenged the commercial sector to build all the Olympics as sustainable development. The commercial sector rose to this challenge with innovative responses to Government tenders that was unprecedented. OCA used a process of continuous iteration in the specifications, design reviews, and coordination of the resulting contracts across design, engineering, construction, commissioning and operation. While close supervision had been done by Government before, this was a much more systematic process and it produced more sustainable architecture, urban design and innovative infrastructure than in the past. The most influential factor in architects and other professionals designing Sydney's Olympic venues and infrastructure in accordance with sustainability, was the brief that requested them to do it from the start. Furthermore the approach had endorsement of those in Government who controlled the budget.

The main implication arising from this Olympic case study for *urban designers* is that visionaries can remain in control of their original vision by actively coordinating and supervising the implementation. This does not imply that the founding fathers of a grand design have to build it – instead it says that they need to coordinate it. By starting from one team or one agenda, urban planning and architecture can be implemented across all scales of a project. Sydney's Olympics was awarded the slogan of 'best games ever' but its most profound legacy was a demonstration case for a new approach to constructing a sustainable urban space - through the integration of design and planning.

Nonetheless, eleven years later, after achieving a world show case of sustainable development - Sydney's urban design is uncoordinated and its plans for transport infrastructure are dysfunctional. Indecision within successive governments and blurred roles among numerous professions have prevented metropolitan infrastructure from keeping pace with demand. What happened to the Olympic legacy of perceiving integration across scales of space and architecture? With no single master plan that can stand the test of time, with vested interests in public-private-partnerships and with overlapping professional roles among the disciplines, Sydney has not implemented a design vision. Instead vision itself seems to be what is lost.

### **Scales of Architecture: The Lines of Motion Concept**

It is feasible for a concept to look beyond an individual site, viewpoint, or single profession - whether it is called *urban design* or planning. In this paper, the author is envisaging an architecture that applies across the whole city. In particular, for transport, *Lines of Motion* is a concept that transverses all scales of the „Cities of Cities“. The architectural scales range from the largest - transport network scale, through urban space scale, and through to the smallest - train station scale.

The author designed a scenario to illustrate *Lines of Motion* in a Master degree project in 2010. He called it *Observatory Park Station*. The feature that makes Observatory Park Station different from the design of any other station is that it is a railway station generated from a wider study of Sydney's transport network. The transport study was conducted first, and reviewed the

general transport network of Sydney to identify the missing links at the urban space scale. This was conducted to determine the transport requirements of the urban area, before proceeding to selection of a suitable site for a proposed new train station. A large scale was used to decide where to locate the next smallest scale of design and construction. Observatory Park Station is a result of applying design to all scales, from transport planning for the metropolis, through urban design of areas, to finally the architecture of a train station building. These scales work together and furthermore the outcome would not be as effective without each one of these scales. In this manner, design goes across scales of architecture in a similar way to the intent of Sert's teachings at Harvard University.

### **Planning Scale: The Vision**

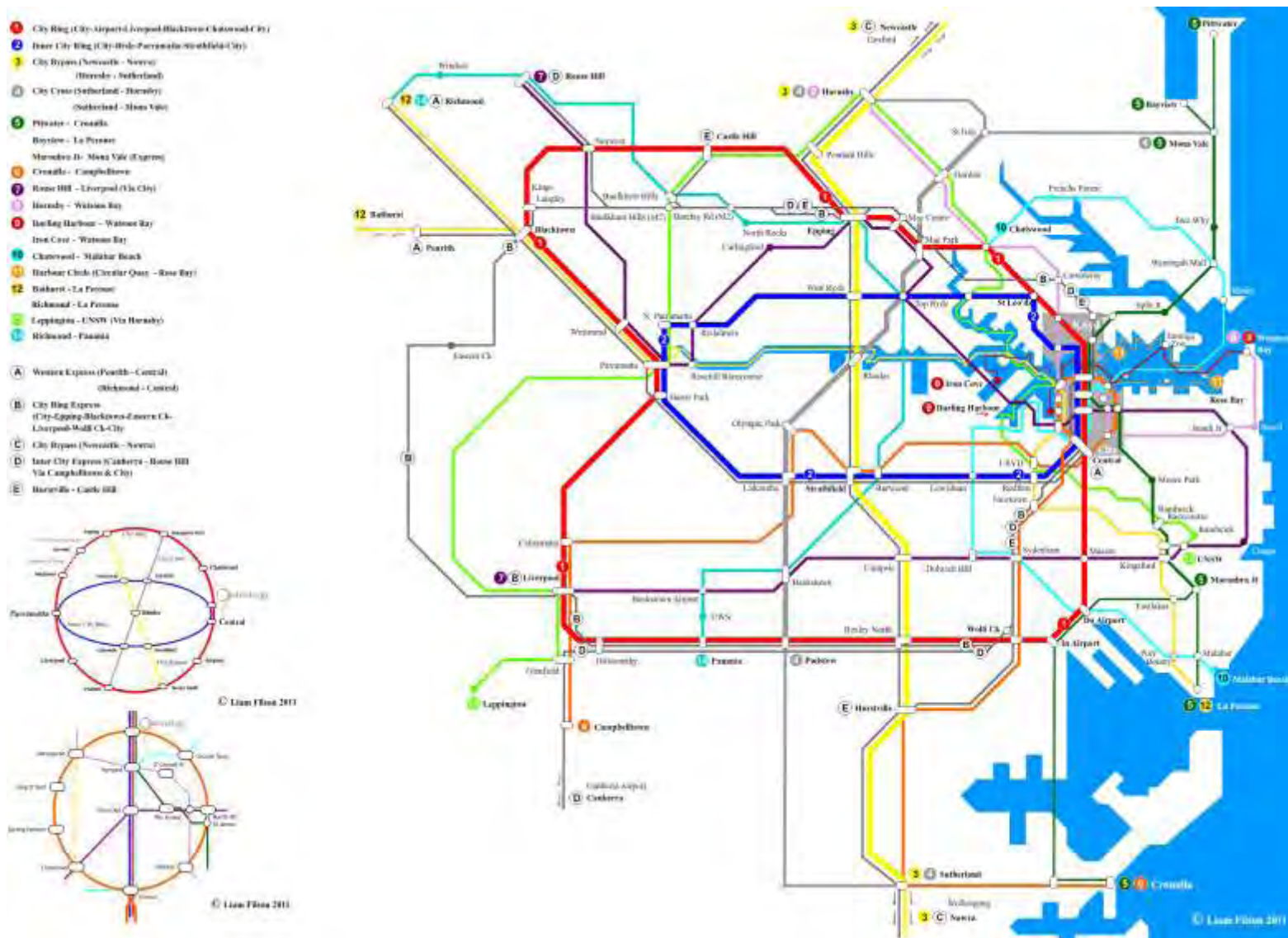
At the Sydney metropolitan transport network scale, Sydney can be regarded as a place where local communities and nodes come together to create a much greater identity than each of the individual cities from which Sydney is composed. Some nodes are not critical to greater Sydney, and other nodes are self-sufficient. Nevertheless, some nodes are key to the whole metropolis. The concept of *Lines of Motion* accepts these levels of critically and gives priority to the preferred ways that commuters want to move around. So the concept tries to connect nodes in a transport design that provides city-wide transport routes for the needs of Sydney-wide travellers. *Lines of Motion* does not try to change the paths already created by travellers, unless there is a clearer path that becomes apparent during the process of iterative review and re-design.

This is the rationale for a *Lines of Motion* approach to first look at the large scale before considering the next scale - to find a site for a train station (Observatory Park). The aim is to take advantage of existing transport routes to find potential sites and opportunities for improvement. Improvement can be in a physical form of the choice of mode of transport. For example train, light rail, T-Way, bus or ferry are possibilities. If a new pathway is needed, the concept can cut and re-tie existing pathways into more streamlined combination of routes. *Lines of Motion* takes a set of criteria into account in the design of transport:

- simplification of the transport system to an intuitive level so that a tourist would understand it easily, with one map;
- simplification of patronage along the same pathway;
- satisfaction of commuters' needs in getting from A to B either by enhancing an existing route or creating a quicker alternative;
- variation in usage of a specific transport mode, such that when one group of commuters depart, another group takes its place and the train / ferry / bus route continues;
- provision of pathway capacity (number) of train tracks or bus lanes which can support two-way journeys (eg: one line per pair of tracks or bus lanes);
- provision of express services by duplication of lines running side by side (where needed) to operate one of the lines as a fast line;
- distributing commuters so that they are not funnelled into the same path.

By adopting these criteria as the basis for transport design and applying them to Sydney, the author designed a metropolitan transport system along the *Lines of Motion* concept and developed a new transport map for Sydney. The map is an outcome of using these criteria and other rules to create a network that allows flexibility as the city's needs change. The map is set out with an over-all grid of four main lines and other lines assist these main lines.

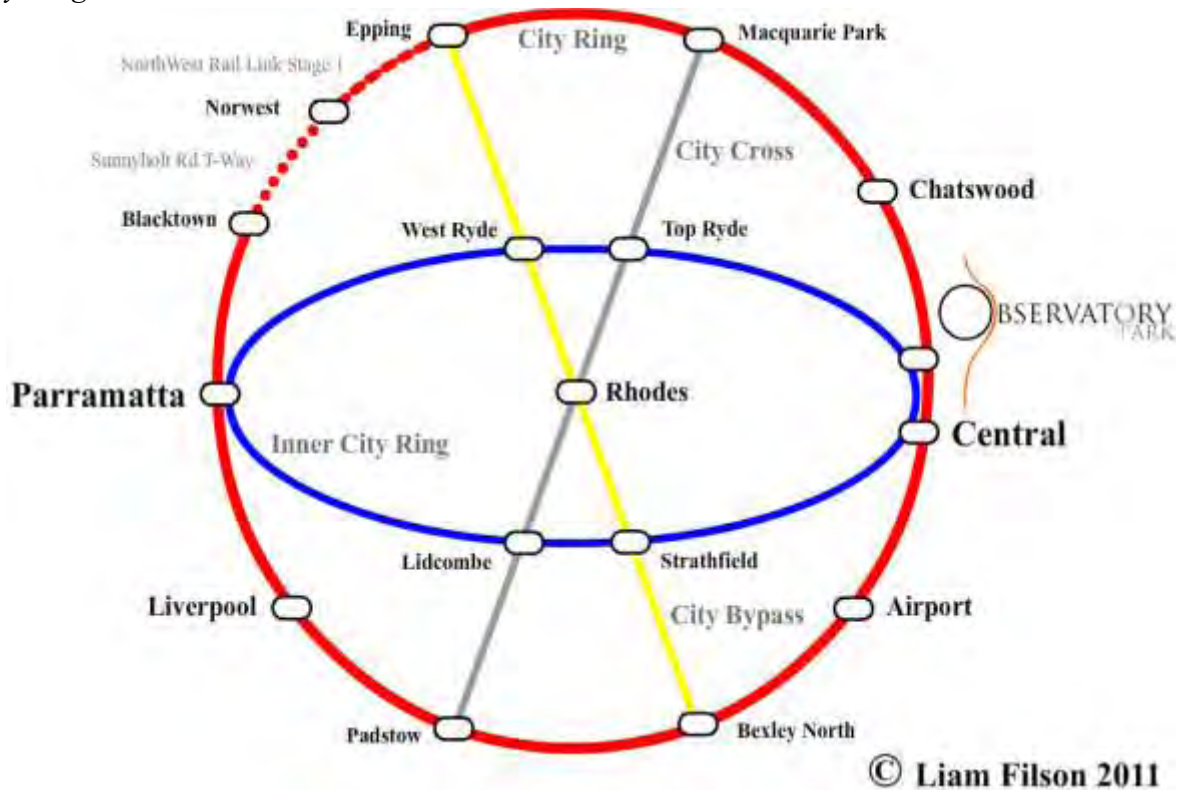
This layout is shown in Graphic #1.



Graphic #1 Lines of Motion – Sydney Network Map, © Liam Filson

## Planning Scale: The Concept

Graphic #2 shows Observatory Park Rail Station as a critical link in the *Lines of Motion* concept. However in the design, the train station's role as a link evolved not from its location or any specifics of its local area - but from another transport concept generated at another scale - the *City Ring*.



Graphic #2 Lines of Motion – City Ring Graphic

For Sydney, the author's (proposed) *City Ring* would address the poor rail connection that currently exists around the „City or Cities“. *City Ring* would connect Epping to Blacktown and create a continuous circuit line to link across the city. The *City Ring* Line is a line type that is used commonly around the world, however it can only be used in particular parts of a network for an overall unifying purpose. These lines are very important as they link other lines together and give distinction to a city as a metropolitan area. Examples are the London and the Moscow Circle lines (Moscow Metro 2011) (Transport for London 2011).

The *City Ring* would create a heavy rail line to link most CBDs and major business parks of Sydney. It would use 76 percent of existing train track and connect: City CBD - Chatswood - Epping - Blacktown - Parramatta - Liverpool - Airport - City CBD. This would create a train line that connects Epping to Blacktown. The rationale fits with the *Norwest Rail Line* and *Parramatta-Epping Rail Line* (PRL 2003) (Department of Transport 2011). It would allow Sydney's transport system to change from its current spokes-in-a-wheel shape to an orbital



pattern, so that commuters do not have to all go via the city's CBD. This forms the pivotal piece in the four main lines of the concept, as shown in Graphic #2.

At this point it is worth giving a description of the author's proposed *City Ring*. It starts at Central Station and travels through to Wynyard via the current *City Circle Line* (which is reused in a proposed *Greater City Circle* below). It crosses the Sydney Harbour Bridge using the Independent Public Inquiry proposal of hanging trains under the deck of the bridge (Independent Public Inquiry 2010). Then *City Ring* follows a similar tunnel route to the Metropolitan Rail Expansion Programme, CBD Rail Link (2005) to St Leonards via Victoria Cross (Miller Street and Pacific Highway) in North Sydney and Crows Nest (Department of Transport 2011). From there it uses the current track to Epping and travels via the proposed *Northwest Stage One* section to the Norwest Business Park (Department of Transport 2011). From there the *Line of Motion* concept proposes that the rail line continue via Parklea Markets and follow the State-owned land within the current T-Way on Sunnyholt Road to Blacktown (Transitway 2011). The route would run along existing track to Parramatta and through to Liverpool. A bend would need to be constructed to continue the line on to the East Hills track and connect with Sydney Airport. From here it would return to Central Station.

In general, the advantage of a transport ring is that it defines a city. It integrates the city into a whole from a traveller's viewpoint and allows locals and tourists to understand the layout of the city easily, from a „bird's eye“ perspective. This enables a traveller to understand the public transport system better and offers encouragement to utilise an alternative to the private car.

### **Urban Design Scale: The Vision**

At the urban scale, the *Lines of Motion* concept identifies the Sydney CBD as a transport issue. In the scenario, Observatory Park Station does not need to be considered at this scale because urban requirements determine need, location and design of transport.

The author's study of the local area determined that the current separation of the city's CBD into East and West is the cause of many CBD transport issues. The separation is an artefact resulting from topography, the original placement of the *City Circle* rail line and subsequent growth on the western side of the city's CBD.

## Urban Design Scale: The Concept

*Lines of Motion* proposes a new *Greater City Circle* railway line that would travel around the western edge of the city's CBD to incorporate areas like Barangaroo. It would link back into the existing *City Circle* railway at Circular Quay Station. This is only part of a much larger Line 6 which would connect to the city (shown in Graphic #1, the city wide map). The rationale fits with the Western Relief Line, Pitt Alignment and Second Harbour Crossing because the Central-Wynyard track would be re-used as a through-line and create a new railway interchange at the northern end of the CBD (Department of Transport 2011) (Public Transport User Association 2009).



Graphic #3 (Left) Lines of Motion – Greater City Circle Graphic, © Liam Filson

Graphic #4 (Right) Lines of Motion – Greater City Circle Map, © Liam Filson

A proposed *Greater City Circle* railway line would:

- substantially address Barangaroo's transport needs;
- connect Circular Quay and Barangaroo directly as the future East-West city wharfs;
- offer the existing *City Circle* as a quicker alternative to cross-town walking, due to its greater passenger catchment width.

## Architectural Scale: The Vision

Subsequently, the author considered the small architectural scale to design Observatory Park Railway Station. Through an iterative process, the ideal site was ill-defined during the author's study of other scales of architecture. As the design developed and only after the concepts became clearer could a site be determined. Observatory Park is the site that evolved from consideration at several scales.

The proposed rail station at Observatory Park is located at the (now) disused toll gates that are still on the Sydney Harbour Bridge. The *Lines of Motion* concept generated a greater understanding about the ideal location for a transport interchange. Observatory Park Station was a result of the transport needs at larger scales before it emerged as a suitable catalyst for a more streamlined public transport system in Sydney's CBD. Its location and architecture encapsulates consideration of both planning and urban design studies.

## Architectural Scale: The Concept

A strong endorsement for the proposed Observatory Park Rail Station is that it would recreate Bradfield's original „Gateway to the North“ (J.J.C. Bradfield 1915). The interchange concept is an adaptive reuse of the Cahill Expressway and former bridge toll gates. There are three key elements that define the station's architectural design:

- **The Tactile Wall** is a single High-line like element to connect East with West from Circular Quay to Barangaroo (High line 2010);
- **The Chasm** is a sunken space located in the former toll gate area which reveals an underground city at this location. It creates an inclined park that allows continuous uninterrupted flow between platforms;
- **The Obelisk Array** is a unifying grid that symbolically projects out from the Obelisk in Macquarie's Park to connect with the city's history.



Graphic #5 Lines of Motion – Observatory Park Elements Graphic, © Liam Filson

The station's architecture creates a layered and dynamic form via interaction of these three key elements in the context of Sydney's history and geography. By removing the barrier formed by the current Cahill Expressway across the quay and by resolving the visual resistance that the expressway causes currently, the design would flow more easily. It would give an approachability to the harbour and Opera House which is so iconic in the architecture of Sydney itself.

Further details are available at the website: <https://sites.google.com/site/observatorypark/>

## **Conclusion**

This paper has endeavoured to show the benefits of accepting inter-relationships across three scales of architecture in methods used for planning and designing urban space. The *Lines of Motion* concept is such an approach, by first looking at the large scale before considering the next scale. The proposed Observatory Park transport interchange is a building that encompasses design, location and city-wide requirements for transport. It utilises conscious iteration in design and was selected as a site within an overall architecture, instead of being an independent idea or separate process. The outcome is architecture that arises on the site and can give back to the whole city because it fits into its larger metropolis.

The silo divisions that obstruct the perspectives of different professional practitioners have developed - unfortunately - in the culture of the planning and design disciplines. This has lowered trust and coordination among these professions. It has created division between planning and design that has been continued on for generations of practitioners. *Urban design* attempts to break through these barriers but the reality is that while ever professionals do not trust one another, or decline to work together, the architecture of cities suffer. Instead, it is interdisciplinary collaboration among a city's designers and planners that gives a city its individuality. Without this, a city loses its unique distinction and sense of place.

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# **The Application of Sustainable Neighbourhood Design in Creating a Resilient Neighbourhood in the Face of Natural Disasters**

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## ABSTRACT

Exposure to natural disasters creates significant risks in urban areas where human and economic resources are located in large numbers. The built and natural environment of these resources are constantly changing through new development projects. This continuous urbanisation brings new challenge to reducing the risks of natural disasters, particularly given that the number of natural disasters affecting urban populations has risen four-fold since 1975. The recent natural disasters in New Orleans, Haiti, Christchurch and Brisbane showed that community resilience at the neighbourhood level played a critical role in managing the after effects of the disasters.

Community resilience is the capacity of a community to absorb shocks and stresses either by adaptation or resistance, to maintain certain basic functions and structures during disastrous events, and to recover and bounce back after these events. Unfortunately this community resilience is not evident in every neighbourhood. Neighbourhoods which are based on an urban livelihood comprising the capabilities, assets and activities required for a means of living both now and in the future typically offer such community resilience.

In this context, the purpose of this paper is to identify how sustainable neighbourhood design can be utilised to generate a livelihood at the neighbourhood level which ensures a resilient neighbourhood, and ultimately reduces the vulnerability of the community to natural disasters.

**KEYWORDS:** Natural disaster, community resilience, urban livelihood, sustainable neighbourhood design.

## 1. INTRODUCTION

Exposure to natural disasters creates significant risks in urban areas where human and economic resources are located in large numbers. The built and natural environment of these resources are constantly changing through new development projects. The motivation for these projects is based upon the opportunity to create new socio-economic portfolios for city dwellers and also to generate economic benefits to investors, developers and various types of commercial entities. This city development process brings almost every year new roads, new residential neighbourhoods, new business parks, new shopping centres, new schools/colleges and new network of utilities and services.

At the same time, continuous urbanisation brings new challenges to reducing the risks of natural disasters. A report by UN-Habitat, an agency responsible for human settlements, says the number of natural disasters affecting urban populations has risen four-fold since 1975. During the last few years the world witnessed terrible human loss and material destruction by natural disasters. In this year already six large scale events, which include the Brisbane floods, the Victoria storms and Cyclone Yasi that hit Australia in January and February respectively, the Christchurch earthquake in New Zealand in late February, the March earthquake and tsunami in Japan, and the tropical storm Irene in the USA in August, have taken place.



We have seen through stunning images provided by the global news media how established urban areas in Australia, New Zealand, Japan and the USA have been affected by these natural disasters. These events reminded us about the importance of a disaster risk reduction system not only for the traditionally vulnerable communities in low socio-economic rural areas, but also for the communities in economically strong urban areas. The Indian Ocean tsunami of 2004, which killed at least 230,000 people, would have been a tragedy whatever the level of preparedness; but even when disaster strikes on a titanic scale, there are many factors within human control—a knowledgeable population, a good early-

warning system and settlements built with disasters in mind—that can help to minimise the number of casualties (The Economist, 2007). At the same time, the recent natural disasters in New Orleans, Haiti, Christchurch, Brisbane and Japan showed that community resilience at the neighbourhood level played a critical role in managing the after effects of the disasters.

However, a fully effective disaster risk reduction system is not that easy to develop and implement, as it needs to consider a number of factors and involves a number of issues, experts and disciplines. At the same time, the system needs to cover both pre and post disaster periods. In this context, this paper concentrates only on one of the components of the system, and identifies how sustainable neighbourhood design can be utilised to generate a livelihood at the neighbourhood level which ensures a resilient community, and ultimately reduces the vulnerability to natural disasters.

## 2. THE CONCEPT OF A RESILIENT NEIGHBOURHOOD

Community resilience is the capacity of a community to absorb shocks and stresses either by adaptation or resistance, to maintain certain basic functions and structures during disastrous events, and to recover and bounce back after these events. Unfortunately this community resilience is not evident in every neighbourhood.

A neighbourhood is based on a network of physical systems and communities. The physical systems include neighbourhood's roads, buildings, infrastructure, open spaces, water courses, and vegetation, and ultimately these form the built and natural environment of the neighbourhood. Communities form the social and institutional components of the neighbourhood, which are various forms of organisations, institutions, authorities and agencies, which operate in an urban area (Godschalk, 2002). During a disaster, the physical systems and communities must be able to survive and function under extreme stresses, otherwise the neighbourhood would be extremely vulnerable to disasters.

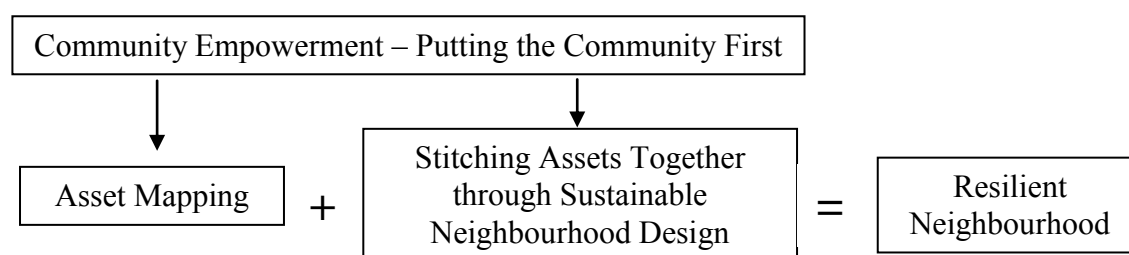
A recent study of state of Orissa in India demonstrated that some of the rural neighbourhoods in the state are the most highly resilient and the livelihoods in these neighbourhoods are advance in term of cultural, educational, infrastructure and industrial development. This year's the near simultaneous floods in Brazil and Brisbane in Australia provided a contrast in

terms of their impact (and media coverage). Brisbane experienced huge property damage, but relatively little loss of life and the community coped relatively well with the recovery work and showed the appropriate level of community resilience to combat one of the worst natural disasters of the country's recent history. Brazil, however, experienced a large loss of life due to lack of resources in the affected area and vulnerability of its urban neighbourhoods to natural disasters.

These incidents have shown that a neighbourhood with livelihood that possesses a large stock of social and physical capital cannot be easily dislodged from its usual condition, but if dislodged by adverse shocks by natural disasters, its reservoir of social, economic, environmental and physical resources can assist it to return to its original condition. In the opposite case, a neighbourhood severely deprived of social and physical resources always struggles to return to its original condition after any form of natural disaster.

Therefore the concept of a resilient neighbourhood is based on the assets and capacities of neighbourhood's physical systems and the quality, skills and resources of the local communities. At the same time, the successful application of communities' skills and resources relies on empowering of the neighbourhood residents to build their own opportunities, supporting their access to assets, and developing an enabling policy and institutional environment.

In this context, it is noted that the purpose of sustainable neighbourhood design is to ensure a livelihood which comprises the capabilities, assets, quality and activities required for a means of living both now and in the future. It is therefore considered that sustainable neighbourhood design principles could be applicable in creating a resilient neighbourhood. In this respect, three specific design considerations, as shown in the following diagram, form the resilient neighbourhood development process. The specific design considerations, which are discussed in detail in the following three sections of this paper, are applicable for both neighbourhood re-building or retrofitting and greenfields development purposes.



### 3. ASSET MAPPING

The first consideration in the resilient neighbourhood design process is to identify necessary assets for the neighbourhood.

An "asset" is defined as any factor or resource which enhances the ability of individuals, communities and populations to maintain and sustain health and well-being. These assets can operate at the level of the individual, family or community as protective and promoting factors to buffer against life's stresses. (Foot and Hopkins, 2010). At the neighbourhood level physical assets and natural resources are the key elements to provide a physical shape and spatial identity to the neighbourhood, and also to foster community development, local governance and emergency preparedness. This should be the catalyst for any sustainable

neighbourhood development process to achieve community resilience.

Therefore, any neighbourhood re-building or any new neighbourhood development project must include a 'neighbourhood asset assessment or mapping' process. The purpose of this process would be, as identified by the Improvement and Development Agency of the UK, to define:

- The practical skills, capacity and knowledge of local residents.
- The passions and interests of local residents that give them energy for change.
- The networks and connections - known as "social capital" - in a community, including friendships and neighbourliness.
- The effectiveness of local community and voluntary associations.
- The resources of public, private and third sector organisations that are available to support a community.
- The physical and economic resources of a place that enhance well-being.

(Foot and Hopkins, 2010)

The neighbourhood design process usually starts with a site analysis, which needs to be combined with the neighbourhood asset assessment process to produce an asset map. This map would include the number, location, capacity and type of the following five categories of assets.

#### Category 1: Fixed Asset

This category of asset is related to physical structures and identity, such as built structures (including housing stock), plants, machineries and other infrastructure related to various services and utilities (eg. sewer pump station, electric sub-station or transformer, water tank etc.) and various types of roads and movement routes.

#### Category 2: Human Asset

This category includes neighbourhood assets to foster the skills and knowledge people hold, and also their personal health, such as schools, other educational and training centres, health and fitness centres, sports facilities, and health centres and health professionals.

#### Category 3: Environmental Asset

This category of asset is to provide neighbourhood amenity and to hold natural resources, such as parks, reserves, open spaces, mountains, forests and water bodies.

#### Category 4: Social and Cultural Asset

This category of asset enhances social norms and networks, cultural values and related infrastructure, such as religious institutions (ie. church, mosque, temple etc.), community halls, clubs, voluntary organisations, recreation centres, community and local authority organisations.

## Category 5: Economic Asset

This category of asset is related to the economic growth of the neighbourhood and community's specific employment skills, opportunities and infrastructure including commercial enterprises, shops and offices.

Once various types of assets are identified, these need to be included in the overall neighbourhood vision and incorporated physically in the neighbourhood setting. In this respect, the second consideration in the resilient neighbourhood design process is the tool to assemble assets together, which is described in the following section.

### **4. STITCHING ASSETS TOGETHER THROUGH SUSTAINABLE NEIGHBOURHOOD DESIGN**

In the current age of globalization, world's natural resources are continually shrinking, consumerist culture and hi-tech inventions are increasing, and peoples' lifestyles are rapidly changing. Therefore, neighbourhoods should be able to provide agile environments that accommodate rapidly changing resources, needs, activities and technologies. The neighbourhoods must respond to communities' sophisticated socio-cultural, economic, environmental and political demands and tailored solutions that closely reflect their values and needs. In this respect, the general intention of sustainable neighbourhood design is to ensure a sustainable community where residents are satisfied and in which they are happy to continue living now and in the future.

A UK study, which assessed the sustainability of eight former coal-mining neighbourhoods, found that social and environmental issues were more influential than the quality of housing on people's sense of well-being and satisfaction with the neighbourhood (Green, Grimsley and Stafford, 2005). It is therefore considered that sustainable neighbourhood design, which is the preferred tool to stitch assets together, needs to provide attention not only to neighbourhood's capital assets but also to community's socio-cultural and environmental assets.

In this context, the design considerations in sustainable design process, which are particularly the catalysts in stitching assets together to achieve community resilience at the neighbourhood level are discussed below.

- Location to ensure safety and long term existence of all categories of assets

The neighbourhood layout needs to consider appropriate locations for various land uses, and neighbourhood facilities and assets so that they are not directly threatened by any likely natural disaster. The layout needs to accommodate emergency transport routes, infrastructure and facilities in order to ensure neighbourhood's capacity to withstand sudden temporary shortages of water, food, energy and other critical services. The location of new neighbourhood facilities needs to be considered appropriately to avoid unnecessary dislocation of existing production facilities, businesses and services. The housing blocks need to be close to basic community services, places of employment, and amenities.

- Distribution and capacity to ensure efficiency of all categories of assets

Deficiencies and scarcities of various form of neighbourhood assets (as identified through the asset mapping) in one neighbourhood need to be specifically remedied during the design of various neighbourhood facilities including school, open spaces, communal facilities, neighbourhood centre etc. The neighbourhood design needs to ensure that various assets and community facilities are distributed appropriately throughout the neighbourhood so that these provide residents' easy and direct access and meet the needs of the whole community. The design should encourage mixed-use and ensure a balanced distribution of various land uses throughout the neighbourhood through an appropriate roading, block and open space layout so that the neighbourhood can support the regional targets for infrastructure loading, ecological carrying capacity, economic growth and housing accommodation. The built structures, various neighbourhood facilities, movement routes and other infrastructure need to be climate sensitive to ensure the low operating costs of buildings and infrastructure which will contribute to the long term quality of life of residents, and the competitiveness of the local authorities and their businesses. At the same time, the resource demand by the neighbourhood needs to be consistent with the long term capacity of the city's infrastructure and the region's resource base.

- Connectivity to ensure easy availability of all categories of assets

An inter-connected street and pathway network needs to be considered to provide easy, safe and direct access to all communal facilities within the neighbourhood. The site layout of the neighbourhood should allow residents' easy and direct access to natural landscapes and green spaces. The layout needs to encourage walking and cycling as attractive and alternative movement options. The movement options need to complement the requirements of youth, seniors, and people with disabilities so that they can live side by side in the same neighbourhood.

- Diversity to ensure effectiveness of all categories of assets

The mix of land uses needs to be considered to offer various opportunities for live, work and play in the same neighbourhood. The neighbourhood layout needs to accommodate a variety of housing which provides affordable and attractive choices for all the people who make up a community, including families, empty nesters, single parent families, childless couples, seniors on fixed income, and one-person households of various ages. The variety and flexibility in the block and lot layout needs to be considered so that residents can live in the same neighbourhood throughout their life and people of varying income levels can choose to live near their work, favourite schools, and other amenities. Multivalent spaces need to be considered for communal activities for effective and efficient land utilisation purposes. The neighbourhood layout and facilities need to accommodate various forms of convenient, comfortable and affordable transport modes so that residents can choose to walk, cycle or use public transport without any significant loss in time or convenience.

- A sense of place to ensure the community's cultural assets

The sense of place needs to be reinforced in the design of the built environment, and the manner in which neighbourhoods are integrated into urban, rural and natural surroundings. The neighbourhood needs to accommodate and highlight the local identity which is rooted in the natural features and history of the area and local community's pioneering traditions and culture. Gateways, focal points and other prominent features in the neighbourhood design need to be considered to reinforce the character of the community and the place. Design pallets for various built forms and landscape elements need to be considered in the overall design to assist building and landscape designers so that they can play with the key themes, and evolve an increasingly distinctive style appropriate to the place.

- A socially interactive and flexible environment to ensure the community's social assets

The physical layout needs to enhance the day to day community interaction so that the residents and local businesses can know each other appropriately, and feel comfortable against likely risks and know how to respond and work together when disaster strikes. The neighbourhood design needs to be flexible enough, which is capable of adapting with ease to natural disasters and also to changes in climate, technology, demographics and economic conditions.

- Preservation and enhancement of natural resources to ensure the neighbourhood's environmental assets and also to complement fixed infrastructural assets

The neighbourhood layout needs to respect, maintain and restore the natural functioning of the landscape, especially rivers, streams and wetlands, and sensitive areas should be protected. The flow of water, waste and energy into and out of neighbourhoods needs to be reduced so that the efficient use of natural resources at the neighbourhood level reduces the overall city's vulnerability to shortages in supply, sudden price hikes, and natural disasters. The neighbourhood landscaping needs to include multi-layered plantings that actually increase net habitat for many species, which will be relative to pre-development conditions. Trees, gardens and hedgerows need to be considered for cost-effective 'green infrastructure' contributing to a quieter and more pleasant micro-climate, shading buildings, cleaning and retaining storm water flows and improving air quality.

- Safety and amenity to ensure the community's socio-cultural assets

Crime prevention through environmental design (CPTED) principles need to be considered in the layout design so that connections between buildings and open spaces encourage community members to watch out for each other. Public spaces (including public reserves and movement routes) need to be in prominent and directly visible places and tend to be alive day and evening. Buildings and facilities need to offer individuals the level of control they need to feel safe at all times. The layout needs to offer a safe access to all neighbourhood facilities by all groups of the community. The neighbourhood amenity needs to be considered through an appropriate built environment design and the necessary landscape elements.

## **5. COMMUNITY EMPOWERMENT – PUTTING THE COMMUNITY FIRST**

As discussed, sustainable neighbourhoods are those that are able to sustain their development over time. These neighbourhoods have a stockpile of assets which can be used to fight against the changing circumstances. As described in Section 3 of this paper, more than just financial or physical, such assets are cultural (ways of thinking and acting) and social (connections with others) as well. By developing a critical mass of assets through an asset assessment and then subsequent physical design, neighbourhoods are able to meet their needs and aspirations on an ongoing basis. In this respect, residents' participation through an appropriate neighbourhood governance structure is integral to both the process and outcome of the resilient neighbourhood concept. Such involvement is the very basis through which the neighbourhood itself builds the array of personal and community assets needed to ensure its long-term vitality (Leviten-Reid, 2006).

A "putting the community" first approach will ensure that the residents of the neighbourhood have a voice in directing community development and key stakeholders regularly collaborate on how to maintain existing neighbourhood assets and also how to develop new assets. To achieve this, community members need to be engaged early and continuously in the neighbourhood planning, design and development process. Local government's role would be to facilitate a positive and active level of engagement. The local level governance structure should provide a platform where the governments, public agencies, businesses, utilities and community organisations would be able to come together on a regular basis to discuss long-term policy, and where consensus exists, would be able to align their plans, policies and programs. The neighbourhood design needs to put emphasis in creating the appropriate number and types of facilities, and communal physical assets which would ensure an on-going involvement of the community members in the operation of these assets. A resident led and managed design guideline system could be considered to ensure community's long term involvement in the design development and subsequent evolution of design in the neighbourhood.

This type of community empowerment would assist to develop partnership among various parties and bring trust among them. When the local partners and community members have the access to information on local government plans, they have the capacity to challenge and lobby local government on disaster management and the allocation of appropriate resources.

## **5. CONCLUSION**

As the number of devastating weather related and geo-physical disasters and processes increases, community risk in our continuously growing and densely populated urban areas rises too. In this context, this paper identifies that development of resilient neighbourhoods through sustainable design process could be one of the effective tools in the disaster risk reduction system. This particular tool could assist in creating strong and safer communities, and these communities would be based on the capacity and assets of people and place now and in the future.



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# **Effect of Gender on Thermal Comfort in Multicultural Public Places**

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## **ABSTRACT**

*The city and the urban environment became extremely important in the daily lives of the increasing number of urban populations across the world. Urban research acknowledges that planning urban places should be responsive to the diversity of population. The aim of this paper is to analyse the results of thermal comfort study in the outdoor urban places. The location has been monitored regarding standard comfort variables: air temperature, humidity, wind speed, and globe temperature. The quantitative assessment of comfort conditions was combined with a questionnaire of pedestrians' thermal comfort perception. In this paper, the analysis of observed thermal sensation with regard to gender and cultural background concerning the sensitivity of different groups to heat and cold is presented.*

**Keywords:** Thermal Comfort, Outdoor Places, Cultural Diversity, Urban Climate

## **INTRODUCTION**

Urban places are the common ground where people carry out the functional and ritual activities and play an important role of binding the community (Carr et al, 1992). In the last decades, the growing number of migration in global cities created a plurality of cultures as well as a new challenge for urban designers whose role is to manage the coexistence of different people in shared places (O'Byrne, 1997; Short and Kim, 1999; Hawkins, 2006). Especially in global cities, researchers recognised that public places should be designed in order to promote inclusion, inviting and accessible in order to attract large numbers of people and generate cultural diversity (Bloomfield & Bianchini, 2005; Janssens et al., 2009).

Amongst other factors, the acceptance and use of outdoor spaces are dependent on microclimatic conditions. Understanding the richness of environmental conditions in outdoor urban places and the users' comfort implications open up new possibilities for the development and improvement of urban spaces (Panagopoulos, 2008). However, the satisfaction with the thermal environment of the space doesn't only depend on the microclimate, but also on personal variables of the users. The individual differences in experiencing thermal environment are well studied. However, the differences between different cultural backgrounds and the male and female subjects are relatively small (Karjalainen, 2007). An awareness of these issues would be valuable to urban designers, not by the way of limiting possible solutions, rather by enriching the design possibilities. In this paper, we are concerned with these personal differences of the users. The study examines the influence of the cultural background and the gender on the thermal comfort of the outdoor places users.

## **STUDY AREA**

"A home to people from many different countries, Australia is indeed a multicultural place." (S. Thompson, 2003)

Since 1788, Australia has been received immigration when white colonists invaded a land already occupied for millennia by Aboriginal groups (Burnley, Murphy, & Pagan, 1997). This long history of migration in Australia has brought with it increasing population diversity.

Field survey is carried on in the City of Greater Geelong in the state of Victoria (  $44^{\circ}22' S$  ,  $3^{\circ}0' S$  , at an altitude of 23 m). To ensure the presence of users having different cultural background, the study took place on a multicultural festival parade on a typical summer day (the 26<sup>th</sup> of February 2011).

## METHODS

To achieve the aim of the study, both the objective measurements and the subjective assessments are used in measuring the thermal comfort sensation of the users. Data collections included environmental measurements as well as human participation. The average microclimatic variables were measured at the site using a portable weather station set to record the measurements at 15 minutes interval from 10:00 to 14:00 at a height of 1.6 m above ground. The results of the microclimatic measurements are shown in figure 1.

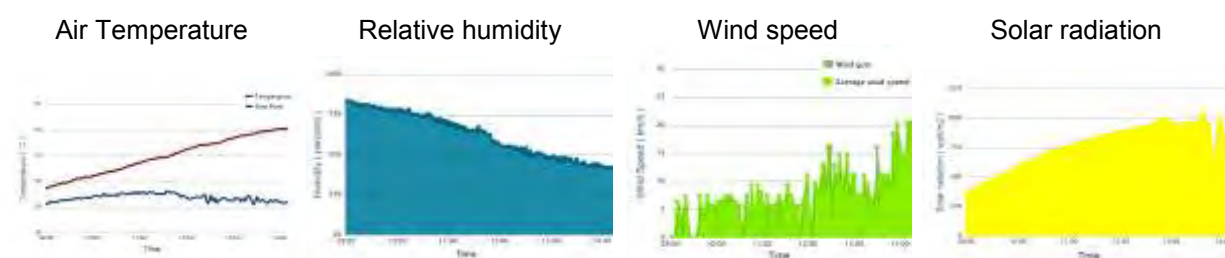


Figure 1: The microclimatic measurement from 10:00 am to 02:00 pm

As stated by Honjo (2009) there remain problems in the assessment of outdoor comfort indices. However, SET\*, PMV and PET have proven to be suitable for application at the current state of the art (Honjo, 2009; Pickup and de-Dear, 2000). In order to assess the thermal comfort, The PMV index were calculated as using Rayman program. The PMV values are shown in table 1.

Time	10:00	11:00	12:00	13:00	14:00
PMV	1.1	1.6	2.4	2.9	2.6

Table 1: The PMV values calculated by Rayman from 10:00 am to 02:00 pm

The human participation was examined through a questionnaire survey that took place during the field measurements. The questionnaire was divided into three parts. The first part was a demographic data collection (age, gender, and cultural background). Using the ASHRA 9 point thermal sensation vote scale, the overall thermal comfort's perception of the users was investigated. The last part of the questionnaire was reviewing the perception

and preferences of individual microclimatic parameter. Furthermore, the activity level and the clothing were observed.

## RESULTS

According to the Australian bureau of statistics, Australian population is formed of 10 different cultural backgrounds. The number of responses of different genders from these different backgrounds is shown in figure 2.

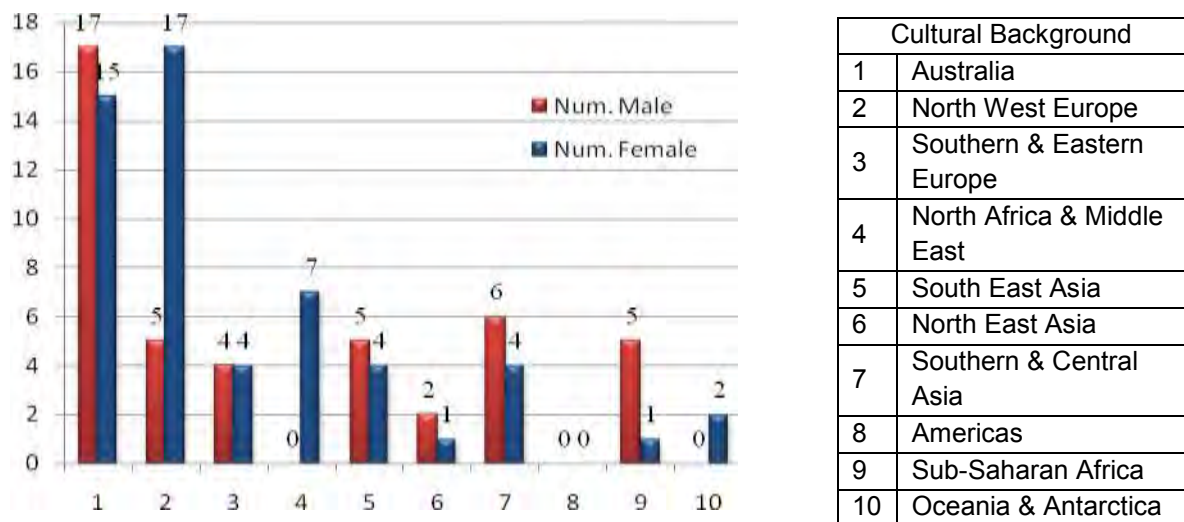


Figure 2: number of responses of different genders from the 8 cultural groups

The number of responses for the overall thermal comfort according to the gender is shown in figure 3.

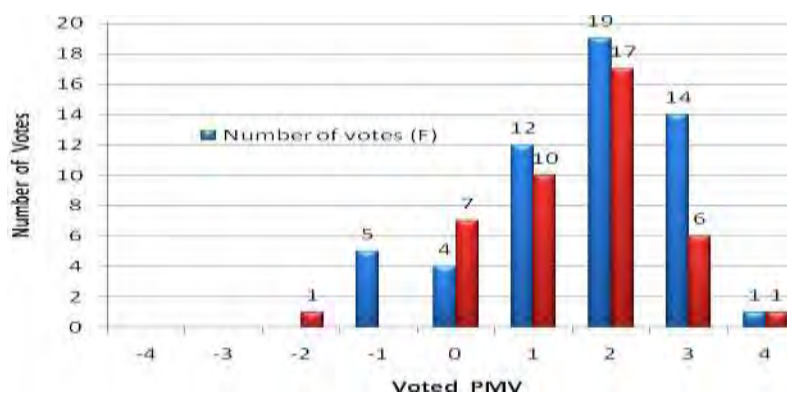


Figure 3: number of responses for overall thermal comfort according to their gender

Expressing the voted thermal sensation of the surveyed male and female subjects as a function of the measured PMV value on the same graph show their relative sensitivity to heat and cold as seen in figure 4.

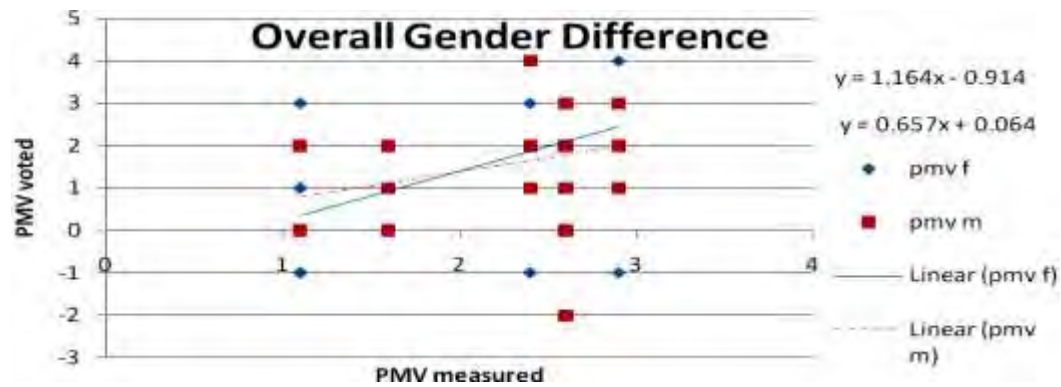


Figure 4: Gender differences in sensitivity to heat and cold

The correlation between the female and male according to their thermal comfort votes is relatively weak (0.25). However, from the figure we can notice that under warm thermal conditions the responses of men and women were about the same. However, under the coolest conditions, women feel more uncomfortably cold than men.

In order to examine the cultural background effect on sensitivity of gender to heat and cold, we distributed them according to the Australian Bureau of Statistics' different cultural groups. To increase the accuracy of the results, four samples of different cultural backgrounds with highest number of responses has been chosen. These are Australian, Southern Eastern Europe, South East Asia and Southern Central Asia. The voted thermal sensation of four different cultural background groups of female subjects, as a function of the measured PMV values is shown in figure 5.

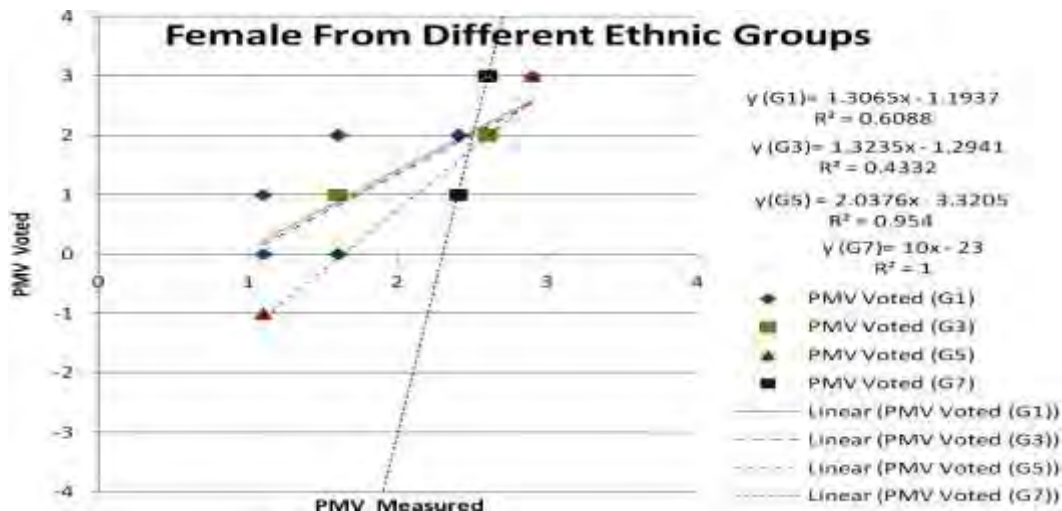


Figure 5: Cultural background effect of female subjects to heat and cold

It is noticed from the figure that under extreme conditions (cold and hot), different ethnic groups show different sensitivity with subjects from group G1 being more comfortable and those from group G7 the less comfortable as seen from their deviation from the ideal condition  $PMV = 0$ . The difference between the groups is noticeable.

The voted thermal sensation of four different cultural background groups of male subjects, as a function of the measured PMV values is shown in figure 6.

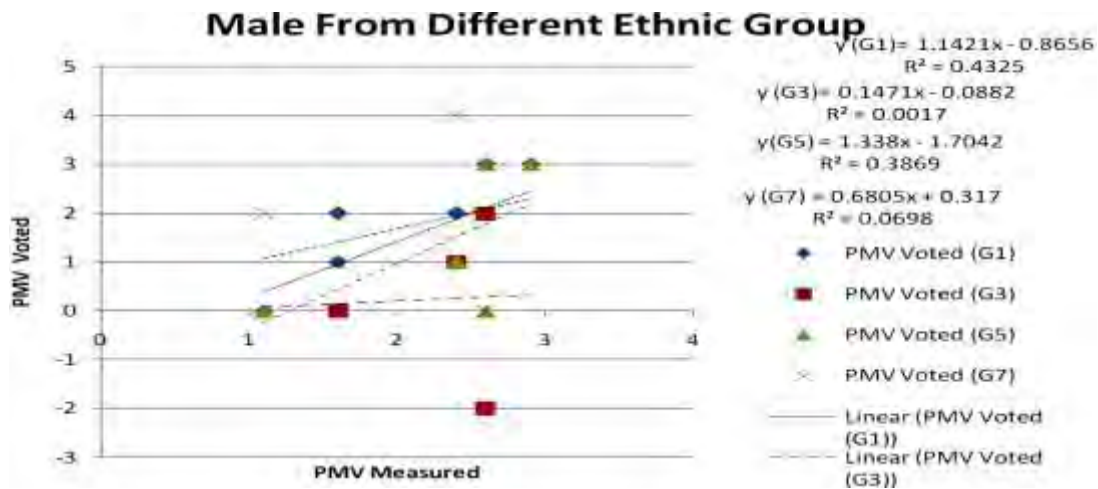


Figure 6: Cultural background effect of male subjects to heat and cold

The same behaviour is repeated for male from different ethnic groups. Here also we see that the group G7 shows the biggest deviation from the ideal conditions while the other 3 groups show almost identical behaviour. Figures 5 and 6 suggest again that female subjects are more sensitive to uncomfortable conditions (higher deviation in all groups) as reported in previous studies (Kruger, 2010)..

## CONCLUSION

The analysis of observed thermal sensation with regard to gender and cultural background concerning the sensitivity of different groups to heat and cold was presented. We found that in general under extreme conditions, women feel more uncomfortably than men. Sensitivity is clearly different for different ethnic groups. For both female and male groups, subjects from group G1 show the most comfortable behaviour. This could be understood as this group represent the Australian people and are expected to be the more adjusted with the weather. More interviews are needed in order to ensure more data to cover the wide range of climatic variations.

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# **Consumer choice as a method of raising the design quality of new homes and neighbourhoods**

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## **ABSTRACT**

*Issues relating to housing growth – how much, what and where – have often overshadowed issues relating to housing quality, in particular the type of places being created. The UK's Commission for Architecture and the Built Environment (CABE) championed the design quality of new homes and neighbourhoods through its 'Building for Life' initiative.*

*How can design quality be improved alongside increasing pressure to build more homes - quickly? The new Conservative/Liberal coalition government's drive to both reduce industry regulation and build the country out of recession provides an added dynamic and a challenge to those who promote design quality in residential-led developments. This research suggests that design quality could be improved by harnessing the potential power and influence of consumer decision making.*

## **Keywords:**

Housing design, CABE, Building for Life, Population Growth.

## **Introduction**

The concepts and ideas presented have the potential to influence the Australian planning and development industry subject to a future Australian national framework for residential design quality being developed (akin to Building for Life – see [www.buildingforlife.org](http://www.buildingforlife.org)). Such a framework would complement Australia's growing focus on urban design and place making as demonstrated through documents such as the Charter for Queensland Places (Queensland Board for Urban Places, 2010) and the Australian Government's forthcoming Urban Design Protocol. However, these concepts and ideas also have the potential for growth beyond the British and Australian planning systems, extending to a wider global audience.

## **Background**

Since the publication of the UK's Commission for Architecture and the Built Environment (CABE) housing quality audits (CABE, 2004, 2005b, 2007) and more recently the high profile and controversial press coverage of the former UK Labour government's £1.06 billion „Kickstart“ housing programme, the quality of new homes and neighbourhoods has been the subject of increased scrutiny.

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„Kickstart“ was a fiscal stimulus package that is expected to deliver up to 22,398 new homes nationwide by 2012. Led by the government's Homes and Communities Agency, Kickstart was controversial in that the programme was found to fund „poor“ and „average“ quality schemes when assessed against the criterion of a design audit called Building for Life (CABE, 2008a). This was also put in place at a time when the then government's policies (e.g. HMSO, 2007) required the planning system to deliver well-designed homes and neighbourhoods.

CABE as a government quango (Quasi-Autonomous Non-Governmental Organisation) championed the creation of good, ordinary places. However CABE criticised the fact that many of these ordinary places largely comprised of anonymous and placeless residential suburbs, typified by developers' own house styles. The places to which CABE referred had been largely developed by national house builders, employing standard portfolio products, with varying degrees of local variation and success from an urban design perspective. This has to be understood to be at a time when the government and many local authorities were under increasing pressure to help facilitate the delivery of more new homes to address the country's ever increasing housing shortfall. The level of house building has recently been at its lowest level since 1945.

Over the past decade, it has become evident that the government's aspirations for good design have been compromised by the pressure to build more homes and local authorities varying widely in the importance they place on urban design and place making. As a result, only 18% of new build homes and neighbourhoods met the national Building for Life standard when CABE conducted the country's first nationwide design quality audit (CABE, 2007). CABE's demise led to the abandonment of the proposed second national design quality audit. However, one of CABE's final publications shed light on progress since 2007. In 2010, CABE released evidence from its Building for Life Accredited Assessor database. The database revealed that only 15% of schemes on its database met the standard – a fall of 3%. CABE stated,

“Data relating to formal assessments by local authorities gives a useful indication of the quality of 123 schemes from across England over the last year. The results show that the quality of housing has not improved.”  
(2010,p.7)

Despite CABE's closure in March 2011, it is clear that the challenges associated with design quality remained to be resolved.

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The case for better designed homes and neighbourhoods is supported by economic, social, cultural and environmental justifications. Since 2008, local authorities across England have been expected by government to gather data on the design quality of newly completed residential led developments; auditing the design standard of developments using Building for Life. This data was then reported back to government through „Annual Monitoring Reports“.

The previous (Labour) government's ambitious design quality targets sat somewhat uneasily alongside the quality of schemes securing planning approval across the country. It was not unusual for schemes throughout the early 2000s to have either a weak or absent design led approach despite the introduction of Design and Access Statements in May 2006 (HMSO, 2006). Additional factors that also sat uneasily alongside the previous (Labour) government's design aspirations included:

- established home builder and local authority working practices, where below standard schemes routinely secured planning consent;
- a growing deficit in housing delivery particularly since the global „credit crunch“ when industry output virtually ceased;
- consumer decision-making processes seemingly unaligned with the design quality agenda; local authorities facing challenging efficiency savings;
- Labour's Kickstart programme; and
- the new Conservative-led coalition government seeking to release state control in favour of free-market principles.

These factors both created and continue to create a challenging climate for urban designers employed in local authorities and for those home builders seeking to reinforce and develop best practice and yet achieve commercially viable developments. This climate is further aggravated by the current government's commitment to rolling back state control in planning in order to facilitate home building (that it considers a vital contributor to economic recovery) and the introduction of a „New Homes Bonus“ where local authorities are financially rewarded for each new home built within its administrative area. This bonus has been introduced at a time when government is dramatically reducing other levels of financial support to local authorities placing them under severe financial strain. State-led aspirations for urban design and place making are therefore clearly under threat, with the effective financial paralysis of CABE in autumn 2010 a somewhat unsettling indication of what may lie

ahead. However, the current though very controversial, draft National Planning Policy Framework published in July 2011 makes clear its alleged commitment to „good design“ and development that is sustainable.

However, could a complementary and in some senses, radical new approach to improving the quality of new homes and neighbourhoods be introduced, that relies less on local and central government and instead, creates a climate whereby home builders more proactively design better conceived schemes at the outset, rather than being encouraged or pressured to by local authorities and/or other public agencies? This step change proposition might be brought about by simply helping home buyers to become better informed consumers where they might be more inclined to reject below standard design in terms of the individual buildings and the places in which they are placed.

### **Why do consumers buy a below standard product?**

Research by the Joseph Rowntree Foundation (JRF) highlighted what it called the „expectation-offer gap“ (2002, p.48). This research discussed the concept of an expectation-offer gap in respect of workmanship, internal design, private amenity space and service provision. Whilst the research did not consider the expectation-offer gap beyond design of the home as a singular unit, to the qualities of the street and the neighbourhood, the research offers an interesting and thought-provoking area of debate relating to why people buy products (i.e. a home) that fall short of their expectations and aspirations. This is exemplified by CABE's Housing Audits (2004, 2005b, 2007) and research undertaken by North West Leicestershire District Council which has identified the consumer having to accept a gap in design quality expectation and aspiration versus what products are available and offered on the market. This clearly assumes however, that the consumer is conscious of this gap and the subsequent sacrifices they may be making.

Hedges and Clements (1994 cited in JRF, 2002, p.103) argue within their research:

„...public attitudes are too conditioned by the characteristics of the actual housing market for people to stand back and separate out the intrinsic desirability of ownership as such from the desirability conferred on it by circumstances...”

Hedges and Clements continue to suggest that, „a change in the context might lead to a different balance of preferences“ (1994 cited in JRF, 2002, p.103) although they stop short of suggesting how this context should and could be changed. However, this pre-supposes that the consumer determines their preferences from market availability rather than their own lifestyle and aspiration expectations.

In selecting a new home, it is suggested that a consumer has a series of personal requirements and preferences relating to the home, its affordability and its location – though it is conceivable that these requirements may be limited to a basic mental checklist, rather than robustly testing the current and future performance of the product and the place in which it is located. However, with home moving comprising of more than just preference decisions but also financial, emotional and other logistical considerations (for example, buyer chains and school catchment areas), perhaps it is unreasonable to expect the consumer to draw more than basic conclusions about whether a home and place is right for them. Such a view is reinforced in Thaler and Sunstein's (2009) international best-selling book entitled, „Nudge“ where they discuss the idea that consumers could benefit from advice (or nudges) to help them make better decisions. Thaler and Sunstein argue that hard problems or choices become easier with practice though point out, „unfortunately, some of life's most important decisions do not come with many opportunities to practice...Generally, the higher the stakes, the less often we are able to practice. Most of us buy houses and cars not more than once or twice a decade“ (2009, p.81).

The Joseph Rowntree Foundation (2002) suggested that, „the aim must be to create an “intelligent client” not just a consumer of a product... [however] they are not well equipped to act as “intelligent clients”. Their vision needs to be expanded“ (2002, p.99). Though the JRF also argues that better product choice needs to be complemented by a better informed consumer concluding, „it needs a rethink of both the industry and the attitudes of the house-buying consumer“ (2002, p. 99). For instance, the consumer is now well accustomed to seeing energy efficiency rating bars on home appliances such as fridge freezers and washing machines with the intention of assisting consumers to make a more informed choice. Such ratings therefore „nudge“ the consumer and offer them the *opportunity* to make a more informed choice. It is somewhat ironic that in some instances the consumer is afforded more advice on household products – those products that are placed or used *within* the home, rather than the home itself. Needless to say, these products cost considerably less than the home itself. It is worthwhile noting that the general public is becoming accustomed to Energy Performance Certificates relating to the environmental performance of new and second hand properties and therefore is potentially receptive to new sources of product information.

Hedges and Clements (1994 cited in JRF, 2002, p.104) highlighted during the post-war period that home ownership has been more than about securing a place to live; it is about securing a property that promises a healthy prospect of financial gain. This therefore raises the question whether the „expectation-offer gap“ is overcome by the national preference for

home ownership, compensated by the prospect of both ownership and the promise of financial gain. It is interesting to note that a CABE commissioned Ipsos-MORI survey „Attitudes to the built environment“ discovered that 26% of people are apparently not interested in the way places look and feel (CABE, 2010, p.12). It is therefore conceivable that the current situation of supply not meeting neither need nor demand has resulted in consumers purchasing homes that require compromise simply in order to secure a property to meet their immediate needs, or in the case of first time buyers, take a first step onto the housing ladder. The cycle of residential design quality is therefore repeated by the success of the home building industry – success determined not by quality of place but by units sold and business turnover. The challenge is therefore to secure change where demand exceeds supply and where product and brand differentiation is limited to sales promotions, such as those relating to internal upgrades or cash discounts.

Interestingly, there appears to be an absence of the recognition of the potentially transformational role of the consumer in raising the quality of design with the focus largely upon design control through planning and to some degree persuading the private sector to embrace good design for commercial if not social reasons. Indeed, over ten years ago Carmona (2001, p.4) alluded to the then „increasingly powerful effect“ of the public on improving the quality of new homes. But it is Franklin’s observations that provide the most concise summary of the challenge, which this research seeks to address. Author and researcher Bridget Franklin (2006) commented that „the actions of private house builders are dominated not by regulators or designers but the pursuit of profit and appeal to the market“ (2006, p.98). Franklin’s observations provide a stimulus for a new way of thinking and a fresh approach to securing good quality design in new residential led developments.

### **Creating a more informed consumer of new homes**

A question is therefore asked - how can a step change in the design quality of new homes and neighbourhoods be achieved? And this question must be set within the context of current home builder/local authority working practices, and consumer behaviour; where:

- supply falls short of both need and demand,
- below standard design routinely secures planning consent and,
- below standard developments are not being rejected by the consumer.

Kruczkowski (2008) working for North West Leicestershire District Council developed a quality rating scheme and branded it as „ourplace™“ for new homes based on the nationally based „Building for Life“ set of design standards, developing a simple scoring regime (see figure 1). Under the scheme, home builders receive a rating certificate (with ratings

published on a web site) following planning consent (and where applicable, once ~~again~~ any design related planning conditions have been discharged) for display in their Sales Office. It is expected that over time, consumers will be accustomed to seeing such ratings and expect to see rating certificates displayed in Sales Offices.

Developers who secure „A+“ or „A“ ratings are entitled to use the ourplace™ brand within on and off site marketing material as a method of brand differentiation. Such use of the brand is also intended to raise public awareness of the scheme and generate a source of income to support the costs associated with managing and developing the initiative. Income is generated through the sale of licence agreements to developers opting to use the brand identity and through a commission based revenue stream based on sales of ourplace™ branded merchandise purchased by home builders.

Number of Building for Life criteria met (/20)	Building for Life tier	ourplace™ rating tier
16+	Very good	A +
14 – 15	Good	A
10 – 13	Average	B
9 and under	Poor	C

Figure 1: Table illustrating how Building for Life performance relates to ourplace™ rating tiers

The rating scheme is similar in its ethos to Australia's Green Building Council's ~~forthcoming~~ Green Star Communities rating scheme, whereby consumers are encouraged to consider factors they might not otherwise have considered when considering potential places to move to. Whilst still a pilot scheme, ourplace™ has been adopted by another three other local authorities in England. The pilot authorities in England are North West Leicestershire, South Derbyshire, Charnwood and St. Helens.

### **Early research findings**

Research and monitoring will continue into 2013. Emerging results suggest that planning approvals for below standard schemes reinforce the status quo. It therefore follows that if home builders can secure approvals for below standard schemes then there is no planning incentive for them to design better. As businesses seeking to maximise share holder value one way in which home builders can achieve this is to get the lowest quality (and often cheapest) scheme approved. It is widely accepted that good design generally costs a



developer more in both design development and production. However, it is worthwhile noting that despite the below standard nature of many schemes securing consent, most UK home builders can and have produced well designed schemes, though these remain the exception as opposed to the norm – and consumer exposure to schemes of quality is limited.

Further results suggest that home builders recognise the potential impact and value of a quality rating scheme on business performance if it were to become *mainstream* (ourplace™ is currently a *peripheral* scheme operating across four local authorities). The impact of this finding is significant. As with Australia's Green Star programme, once private industry can see tangible benefits of responding positively to a particular agenda then industry chooses and wants to design better rather than being forced to by public agencies – the success of which is clearly questionable.

Finally, it is widely recognised that consumers are location and price sensitive. Some consumers will buy the cheapest they can (aim to buy below their maximum budget), others will buy the best they can afford (buying up to their maximum budget). However, the research conducted to date suggests that rating developments through such a scheme will raise consumer awareness and encourage comparison „shopping“ between developments *within* a consumers' price and location range.

## **Conclusions**

Initial findings suggest that the home building industry will be more receptive to embracing design quality by embedding it within organisational culture and practice when a quality rating scheme is mainstreamed. This in turn should further stimulate competition, product development, innovation, creativity and brand differentiation („direct positive“ and „indirect negative“). Initial research also clearly demonstrates that home builders are more than capable of building well-designed (and commercially successful) homes and neighbourhoods, with numerous „prototype“ schemes developed over the last decade, e.g. Ravenstone, Leicestershire, Anstey, Leicestershire, and Melbourne, Derbyshire. Whilst these represent only a small percentage of product output, it does raise questions as to why these successful „prototypes“ are not impacting more generally on the bulk of product output, i.e. why are these not more widespread?

The industry has often defended its typical output, claiming that the consumer is not rejecting what some local authorities consider to be below standard designs. It is therefore possible to conclude that below standard design, whilst widely criticised by some local authorities and public agencies represents a viable and perhaps at times lauded business model. Research also demonstrates a gap in consumer expectation and product offer – a gap that could be

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conceivably filled if the principles and lessons of „prototype“ schemes were more readily understood, followed and applied.

It is perhaps inevitable that those advocating the principles of urban design will spend much of their time justifying its value to others, such as those commissioning developments, formulating policies and making decisions – or is it? Perhaps securing the future of urban design in the 21<sup>st</sup> century, which in the recent history of the UK has been at the mercy of political turmoil and the global economic climate, can be safeguarded by focusing on architecture. Not however on the architecture by which we would typically understand it, but the notion of a truly well designed architectural environment – whereby designers and crucially developers, focus their efforts on placing the value of urban design and place making within the consciousness of the consumer. Thus enlightened, the consumer becomes the main stimulus to which the development industry responds.

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## **Designing with Plants and Turf that survive environmental extremes.**

Todd Layt

Floods, cyclones, drought and bush fires have tested our urban landscapes to the limit over recent years. Couple this together with regional regular weather extremes such as humidity, frost, and heat, and the result is one very harsh environment. What can be done in the design phase to help ensure urban planting success in these types of conditions? Firstly, it helps to get the site preparation right, and not make the mistakes that have led to failed projects in recent weather conditions in Queensland and elsewhere. Then it's get the right plant for the right place. That is to match proven plants to survive the floods, the droughts, to resist fire and to best match the plants with the site soils, mulch type and maintenance levels. What do you do after these weather extremes to repair areas? Recent breeding, erosion control research work, and site observation of extreme weather affected sites in Queensland helps shed some light as to what practices perform the best. Some of the case studies listed lead to the conclusion that when done right the results are, green projects that have better survivability and more resilience in urban design.

Note; Where possible in this paper, research information has been placed on Ozbreed's web site to make it easier for it to be found. Links will be displayed through the paper. Copyright issues for some research papers preclude this.

Todd Layt has a long history in horticulture, consultancy, research and the general nursery and turf industry. In the past he was a Director of the International Erosion Control Association (Australasia), and has presented a number of papers at those events in Australia, New Zealand, and the USA. Recently he was involved in writing papers including; quantifying the strengthening of soil by commonly used plants and turf, measuring drought tolerance of plants, and fire retardant plants. Todd has bred a number of successfully used landscape plants and turf types, now widely being planted around the world for commercial landscape and erosion control use, and recently bred the first and only general purpose Australian Native turf. His focus these days is to provide green life solutions for the harsh Australian Landscape.

## **Introduction**

Urban green life is at the heart of our towns and cities. Places like parks, sporting fields, and urban walkways, are vital for an active healthy population. Just as important are passive green spaces around hospitals, housing, units, factories, offices, and even roadsides and railways. Research has often linked health benefits with natural living parks consisting of turf and plants. Patients who overlook parks in hospitals recover better, and residents of high rise housing with access to green open spaces are healthier. They have better mental health, immunity to disease, and work more productively. Even a child's behaviour is improved by natural turf and plants. When people live and work next to nature, they are more relaxed and are less susceptible to high blood pressure, stress and depression. Couple human health benefits, with other positives of green life such as a reduction in the heat island effect, erosion control, better air quality, pollution and heavy metal remediation and you have vital reason to keep urban greenery not only safe but thriving. Did you know 5 square metres of turf provides enough oxygen for one person to breathe each day, or that turf takes in 4

times as much carbon as a modern lawn mower expels. Urban gardens are also an important mechanism for reducing carbon.

We usually only consider keeping our buildings, and people safe from natural disaster, but with all this in mind, should we not be planning to keep our urban greenery also safe, by designing and using it in such a way as to make it resilient to natural disaster. Should we not be taking full advantages of the resilience that green life has to natural disaster. Should we be considering how the use of appropriate plants and turf can mitigate and reduce the severity of some natural disasters? Floods, fire, and drought all hurt our green life, but designing smart urban green spaces can greatly reduce the damage, and the expense of clean up, and rectification. Using certain types of plants around buildings can help greatly reduce the damage from bush fire, or using certain turf types and plants can greatly reduce erosion from floods and massive downpours. Using drought tough plants can reduce dust and respiratory problems in times of drought, heat and severe winds.

## Discussion

### Green life and Bush fires.

Many organisations release lists of plants that are good to plant in bush fire prone zones, but few are based on research. Most are simply based on opinion, but by cross referencing a number of these lists, a more reliable list of plants can be gathered. Be careful however, as some just copy each other. Some lists however are based on plants farmers have used for well over a hundred years as fire breaks, or plantings that have actually helped save people's homes in bush fires. One important study by the CSIRO tested the ignitability of Australian plants. In recommending which plants are more suitable than others for fire prone areas, you need to take all this information into account. It must be noted that any plant can burn when exposed to enough flames and heat, it is just that some are less likely to ignite, or may take longer to ignite. For this reason you cannot rely on plant selection alone to stop bush fires, but it makes sense to use plants that generally delay in their ignition.

The CSIRO study is the only scientific test that tested how quickly both dry and moist leaves of certain Australian native plants take to ignite. In the tests, *Lomandra longifolia* took 38.53 seconds to ignite at 400 degrees using fresh leaves, and 11.13 seconds for oven dried specimens. Compare this to *Eucalyptus elata* that took 11.57 seconds to ignite when fresh, and 3.22 seconds when oven dried, and it is easy to extrapolate why *Lomandra longifolia* and other *Lomandra* types could be a good choice for fire prone areas. Listed below are results for some plants that took longer to ignite, with cultivars that work well in the landscape listed next to the information.

#### Average ignition delay times of leaves at 400 degrees

	Fresh leaves	Oven dried leaves
<i>Lomandra longifolia</i>	38.53	11.13

TANIKA *Lomandra longifolia* LM300 PBR Australia Wide except humid areas like Queensland

NYALLA *Lomandra longifolia* LM300 PBR Australia Wide except humid areas like Queensland

*Lomandra longifolia* Katrinus Deluxe PBR Australia Wide except humid areas like Queensland

KATIE BELLES *Lomandra hystrix* 'LHBYF' PBR Better for humid regions like Queensland

TROPIC BELLE *Lomandra hystrix* 'LHCOM' PBR Better for humid regions like Queensland

SHARA *Lomandra fluviatilis* 'ABU7' PBR Australia wide

*Anigozanthus* (Kangaroo Paw)

40.05

3.51

Based on this data, Kangaroo Paws if kept green, will work well. Avoid allowing there foliage to go dry. Avoid in humid regions. Use Landscape types like Gold Velvet, Regal Velvet, Amber Velvet, or *Anigozanthus flavidus* types. Avoid pot culture or smaller forms, as they are usually just annuals.

*Casuarina glauca*

43.02

10.53

Trees and ground cover form. Free Fall is the only ground cover form.

The full CSIRO paper can be found at [http://www.aff.org.au/Gill\\_ignitibility\\_final.pdf](http://www.aff.org.au/Gill_ignitibility_final.pdf)

*Agapanthus* were not in the CSIRO trial as they are an exotic plant, but over one hundred years ago farmers around Australia planted *Agapanthus* as fire breaks. In the recent bushfires in Victoria, there are some farmers that claim these plants saved them. *Agapanthus* have been one of the most popular plants when it comes to fire breaks. Unfortunately many are concerned that high seed yielding *Agapanthus* could in certain wetter regions have weed potential. Even if this is the case, there are enough types that have very low seed set that are safe selections such as;

QUEEN MUM *Agapanthus orientallis* 'PMN06' PBR is a safe low seeding variety that has high water content in its leaves, ideal for using as an attractive fire break.

Well maintained lawns have been used as fire breaks on many occasions. At this fire at Warragamba near Sydney about 10 years ago, this well maintained lawn stoped a major fire in its tracks.



For more plant lists and literature links go to [www.ozbreed.com.au](http://www.ozbreed.com.au) and follow the links to the research section.

### **Drought**

Drought can be one of the worst natural disasters, leading to fire, dust storms, lack of water resources, loss of crops, livestock, degradation of rivers, and the loss of urban green life. Using drought tough plants and turf on roadsides, in parks, and in any urban landscape is essential in Australia. Roads departments have been testing plants in extreme drought tolerant situations for years and years. In eastern Australia, most roadsides are not irrigated, and as such roads departments have learned which plants survive. Not surprisingly they generally use native plants that are well adapted to the drought cycles of Australia. Some of the mainstay plant types they use are Lomandra, Dianella, Callistemon, Grevillea, Westringia, Leptospermum, Casuarina, Eucalyptus, Acacia, and native grasses such as Themeda, Poa, Pennisetum, and Imperata. These choices have been developed over decades of trial and error, with the departments sticking to plants that have been successful in dry periods. Urban planners can learn from these landscapes, and use plants that live on natural rainfall. In the West with its dry summers and sandy soils, places like Perth do need to irrigate a little, but the amount can be reduced by using drought tolerant plants. Little quantitative study has been done into how much water is required for plants to survive on urban roadsides. One recent study was conducted based on a Californian water use formula, called Wucols. This report can be found at [www.ozbreed.com.au](http://www.ozbreed.com.au) under the research section. It basically studied actual roadside plantings in North Western Sydney, and analysed the rainfall in each area. It showed that even in the



recent drought, many native plants survived and performed well on these roadsides. This study was for one of the driest periods on record for the area. *Lomandra* stood out as a plant type that performed extremely well in this study. So even in drought, there are green life choices for roadsides and other urban landscapes that require no or little water. The study also found that *Zoysia* turf survived these really dry periods on roadsides very well. Empire, a type of *Zoysia japonica*, is now becoming very popular as a roadside turf, due to its ability to survive drought and its low maintenance characteristics. When choosing plant types it is also very important to use the right plant for the right place. For example *Lomandra hystrix* does far better in the Humidity of Queensland than *Lomandra longifolia*. Using greenlife that is very drought tolerant in the wrong humidity region, or cold region defeats the purpose of long term survivability. Another recent paper from the department of Primary Industries rated *Zoysia macrantha*, an Australian native *Zoysia* as more drought tolerant than Couch, Kikuyu and Buffalo. There is one commercial cultivar of *Zoysia macrantha* called Nara, and it has already been used successfully in no irrigation roadsides, and a large army base. A water authority study in the USA found *Zoysia* and Couch turf types to far better survive drought than Buffalo turf. Buffalo turf has become popular as a home lawn, particularly with all the recent TV advertising, but for urban resilience to drought its lack of underground rhizomes, makes it more susceptible to drought damage.



USA water authority study showed Buffalo is not as drought tolerant as *Zoysia* and Couch.

These studies, and the experience of roadside landscapes, proves urban landscapes can survive periods of drought in Australia, and provided the right turf and plants are chosen, drought is one disaster urban green spaces can survive.

## Flood and Erosion

The recent Brisbane floods hurt a lot of people, damaged many buildings, but also devastated large areas of urban green space. But plants and turf are resilient, with many types surviving the flood, with some however doing better than others. Anything with underground rhizomes, for example, survived better than those without. Buffalo turf for instance fared poorly on some turf farms, and in some parks and private homes. Zoysia turf types performed the best in floods, which is interesting, as they also are rated so highly for drought. Couch turf after some clean-up also came back well. Many sporting facilities had to undergo major clean ups, particularly the removal of silt, and in some instances it was easier to replace the turf after all the earth works. At the University of Queensland, 6 of the university's 8 sporting fields went under. It took two weeks before they got onto the fields to start the clean-up. A couple of the fields were left unscathed, and were quickly back in use, whilst others just needed a quick clean up and basic rejuvenation, before the turf was ready again. Some areas needed major scarifying, but the turf could be saved, whilst two areas were total write offs, and needed returfing. With only two fields needing replacement turf, I think that shows how resilient turf can be to flood. It was silt that caused the damage not water. In returning these parks and fields the management had to be mindful of high levels of *E. coli* and faecal streptococci well in excess of EPA guidelines. Applications of Lime solved these problems. One of the biggest parts of the clean-up of parks, gardens and sporting fields in Brisbane was the removal of silt. For example the Brisbane River left behind over 10,000 tonnes of silt on the parks, and sporting fields at the University of Queensland. This all had to be removed.









Plants that could survive being buried by silt or left under water for a time, or those plants that could handle some damage from machinery fared best, and often survived the floods. *Lomandra hystrix*, *Dianella* and *Liriope* did well on many sites. If these get damaged, the rhizomes will reshoot from below the ground. In some instances though, there was just too much silt to save the plants, and replanting was required, but compared to buildings, the cities green life bounced back remarkably well.

Major storm events and floods can cause devastating erosion. Engineers often provide hard solutions for erosion, but this forgoes all the benefits of green life. Using hybrid engineering and green life solutions, like geotextiles, with turf and plants is one solution, but another solution is to use Australian native plants that have better soil strengthening capacity. A study published at the International Erosion Control Association (IECA) conference in Florida, showed many Australian, and some exotic plants have high soil strengthening capabilities. King Alfred, an Australian *Dianella* plant strengthened the soil 752% or 70 kPa, whilst Katie Belles a Queensland *Lomandra* rated 32.3 kPa. Common *Loamandra* only had a rating of 13.6 kPa. One turf variety, namely Empire Zoysia, had a rating of 97.9 kPa, which was far more than Couch and Kikuyu. As a result of this research, roadside trials a few years back, and the fact that Empire needs far less mowing, some roads departments around Australia have now switched from Couch to Empire Zoysia. Most urban RTA roadsides including slopes in NSW are now grassed with Empire, as well as many sites in Queensland. Using specialised erosion control plants developed through specialist breeding can greatly reduce erosion, and protect urban green space from natural disasters such as flood and major storm events. The full paper can be found at <http://ozbreed.com.au/pdf/erosionpaper.pdf> or ordered from the IECA. Nara



native turf is highly salt tolerant according to the department of Primary Industries of Qld, and can handle better the inundation of big seas, making it ideal for coastal erosion control. Better protection of our foreshores from natural disaster may become a bigger issue in the future. DPI Salt Study results for Nara are available at

[http://ozbreed.com.au/download/Zoysia\\_salinity\\_tolerance\\_comparison.pdf](http://ozbreed.com.au/download/Zoysia_salinity_tolerance_comparison.pdf)



Testing the soil strengthening capabilities of plants.

## **Conclusion**

Green space is clearly an important aspect of urban design. Recent research, trials, and breeding of better plants and turf have showcased how green life can also help reduce the impact on these urban areas from natural disaster. The severity of bush fires can be reduced by choosing the right plants and turf. Certain plant and turf types have been shown by research to withstand drought far better than others, allowing well researched urban green life designs to better survive Australia's all too common natural disaster of drought. Many types of plants and turf have been identified to better survive floods, and breeding of Australian native plants and new turf varieties has provided plants ideally suited to the reduction of urban erosion. When designing urban environments to better withstand natural disasters, it is not just engineering solutions that provide the answer to better resilience, but also more resilient plants and turf.

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# **Physical problems of Kuala Lumpur's streetscape: Case study of Bukit Bintang Street**

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## **Abstract**

*In this paper, the current physical conditions of Kuala Lumpur's streetscapes is examined based on a special look at Bukit Bintang Street - one of the most visited streets in the Kuala Lumpur. At the first step of this research, sixteen physical attributes of urban spaces have been revealed and then a qualitative evaluation and a quantitative survey have been accomplished afterwards, in order to examine the current conditions of the identified attributes in the case study area. Some physical problems such as disharmonious skyline, small scale of the roads, improper pavement and flooring, and etc were discovered and examined through a direct observation and photographing of Bukit Bintang Street. In addition, a questionnaire survey with the sample of fifty respondents was carried out to show the user's point of view on the examined problems and the result of survey reveals that the traffic congestion and lack of parking space, in Bukit Bintang Street, were the major problems known by the respondents.*

**Keywords:** Urban space, Physical attributes, physical problem, Kuala Lumpur 's streetscape, Bukit Bintang street

## **1. Introduction**

Examinations on the physical conditions of current urban public spaces can be clearly described as an essential step toward having a responsive and inclusive environment. Therefore, this paper aims to identify the most common physical problems of Kuala Lumpur's streetscape, especially within the old parts of the city, through evaluating the current conditions of physical attributes of the case study street. Bukit Bintang street - as one of the most visited streetscapes of Kuala Lumpur which is located in the Golden Triangle of this tourist city, and is considered to be one of the most important tourist attractions of Kuala Lumpur - was chosen as the case study for examination of its physical shell – façades and floors of this space – to identify its physical problems.

The importance of studying the physical attributes of urban spaces can be seen from the influences of physical spaces on the people's daily activities. The findings can also become a feedback in the training process of designers in order to perceive the significance and effects of the physical attributes of urban spaces on the design of a sustainable city.

## **2. Literature review**

Streetscape is one of the most important designed spaces in the city and considered as one of the two major elements of urban space. so, for examining the streetscape's



features and problems, illustration of urban space implication and attributes is firstly essential.

To clarifying the meaning of urban space in this paper, reference is made to Krier's (1979) theory of urban space as external space. He mentioned that "all types of space between building in towns and other localities are urban spaces."

In order to figure out the physical problems of an urban space, it is first necessary to identify the physical attributes that can influence urban public spaces. Friedmann et al. (1978) was one of the earliest to study the evaluation of urban open space. Substantial resources have been devoted to improving urban open spaces as a result of a growing concern for the quality of the public environment of cities. Krier (1979) carried out a comprehensive research on "Typological and morphological elements of urban space." Speiregen (1965) wrote on the "Proportions of space: Size, scale and enclosure of space." Bently et al. (1985) examined "Visual appropriateness: The role of detailed appearance." Kaplan (1982) contended that a city-dweller is more appreciative of „green“places. Lo et al. (2003) mentioned "other major literatures concerning the design attributes for urban open space include Pushkarev and Zupan (1975), Gehl (1987), Marcus and Francis (1990), Carr et al. (1992), Rubenstein (1992), Cherulnik (1993) and Tomalin (1998)."

## **2.1 Selected physical attributes**

Since streetscape is a one of the two known kinds of urban space - street and square -, the urban space's attributes can adopt as streetscape's attributes. So from the review of the above-mentioned literatures on design attributes in urban space, and with regard to the characteristics of the old parts of Kuala Lumpur city, three groups of physical attributes were identified and selected for this study because of their compatibility in the environment of the Bukit Bintang street. Namely,

- *Design elements and street furniture:* Paving, seating, signs, planting, shelter and canopy.
- *Form characteristics:* Proportions of space, time, skyline and different architectural styles of buildings.
- *General factors:* Facilities for disabled people, parking space, traffic, maintenance and cleaning.

### **3. Methodology**

This study is a kind of qualitative research which attempts to explore the most common physical problems of Kuala Lumpur's streetscapes. So case study was selected as the main strategy of this research and Bukit Bintang street was chosen as the single case study to be examined through two different phases of data collection as follows;

#### **3.1 Qualitative evaluations**

For the visual appraisal, a deep observation and an accurate study of this area were followed by the taking of photographs of the above-mentioned physical attributes. The Bukit Bintang street was visited at different times of the day and during various events to examine all different conditions and the users' behavior. The evaluation revealed the current conditions of these attributes and found which attributes were not at the satisfactory level and could be considered as physical problems.

#### **3.2 Quantitative analyses**

After the qualitative examination of Bukit Bintang street and the identification of the physical problems of the area from the urbanization point of view, a questionnaire survey was conducted to ascertain the users' perspective on the identified physical problems.

The sample of the study consisted of 50 questionnaire surveys on people who lived or worked in the Bukit Bintang street or knew of this area. The distribution of age, race, gender, the purpose of being at the area and the education level of the respondents is summarized in Fig 1. The response sample mainly consists of users aged above 18 and had attained tertiary education level. People were asked to what extent they thought that the Bukit Bintang street has those problems.

	Number of respondent	Percentage
<b>Gender</b>		
Male	23	46
Female	27	54
<b>Age</b>		
18-35	39	78
35-50	10	20
50 or above	1	2
<b>Race</b>		
Local	31	62
Foreigner	19	38
<b>Level of education</b>		
Under diploma	9	18
Diploma- bachelor	26	52
Master-PHD	15	30
<b>Purpose of being in the area</b>		
Living-working	18	36
Shopping- visiting- others	32	64

**Figure 1** Distribution of age, race, gender and the purpose of being at the area and the education level of the respondents.

## 4. Findings

The result of the two phases of data collection is mentioned as follows;

### 4.1 Identified physical problems of the Bukit Bintang street

Through the qualitative process of direct observation and examination of the three groups of physical attributes, some physical problems were identified as follows:

1)Improper walkway paving and flooring, 2)Not enough shelter and canopies to protect people from climate changes such as rain and wind, 3) The lack of suitable street furniture & seating, 4)Irregular signs try to dominate each other, 5)Inadequate pavement and pedestrian crossing, 6)Small scale of the roads,7)The lack of renovation of the old building, 8) The architecture of new buildings contrasts stylistically with the traditional architecture of old buildings, 9) A disharmonious skyline has been created by a proliferation of buildings of random heights, bulk and spacing, 10) The lack of facilities for disabled people, 11)The lack of parking space, 12)Traffic congestion, 13)The lack of public services and maintenance, and 14) The lack of plaza for social events and street show.

#### 4.2 Importance of identified physical problems from the users' perspectives

In the questionnaire survey, people's perceptions on the identified physical problems at three levels –low, average and high – were asked. Since the disharmonious skyline was not a familiar concept for people and it was created mainly through the contrast between the heights of the old and newer buildings, this problem was not mentioned in the questionnaire and only the contrast between the architectural style of old buildings and newer ones was asked. Hence the result of this item was generalized for the disharmonious skyline as well. Fig 2 presents the result of the whole survey. The result showed that traffic congestion with the 86% high rate were the major problem of this area which was followed by the small scale of the roads with 68%. Lack of parking space was the other important physical problems, which 62% of the users ranked highly. 54% of users mentioned that there was not enough shelter and canopies for the raining time and 52% stated about irregular signs on the facades of the buildings. Finally, the contrast between the architectural style of new buildings with old ones with the 20% high rate was of the least importance for the users.

	The physical problems of Bukit Bintang street	Low	Average	High
1	Improper paving and flooring	30%	32%	38%
2	Not enough shelter and canopies	20%	26%	54%
3	Lack of suitable street furniture & seating	38%	36%	26%
4	Irregular signs	10%	38%	52%
5	Inadequate pavement and pedestrian crossing	30%	26%	44%
6	Small scale of the roads	8%	24%	68%
7	Lack of renovation of the old building	30%	42%	28%
8	Architectural style of new buildings contrast stylistically with old ones	36%	40%	24%
9	Lack of facilities for disabled people	26%	30%	44%
10	Not enough parking space	14%	24%	62%
11	Traffic jams	2%	12%	86%
12	Lack of public services and maintenance	30%	38%	32%
13	Lack of plaza for social events or street shows	24%	38%	38%

**Figure 2** shows the extent people think the Masjid Jamek area has the above-mentioned physical problems.

#### 5. CONCLUSION

With regards to Rogers" (1999) contention that good design of urban space rests upon the establishment of a direct relationship with people living and working around there, it is

argued that users' opinions on the design of urban space cannot be neglected in order to achieve a high environmental quality.

It was found that people in an old part of the city such as Bukit Bintang street put much emphasis on the consideration for automobiles travel, scale of the roads and parking space in the design of urban open spaces. According to these major problems, It can be mentioned that people living and working in a high density and old part of the city would require better public transportation system which is probably the only solution for avoiding the traffic congestion, environmental pollution and improving the quality of the area.

Besides, the results reveals the importance of shelters and canopies that offer protection against climatic changes especially in the tropical weather of Malaysia, which is another important urban design attribute. Users' opinions also reflect the necessity of setting rules to regulate installation of commercial signs on buildings of this street.

This research shows the importance of the physical problems of urban spaces from the users' perspective. Further studies are required for finding design strategies to solve the identified problems and achieve a responsive environment, thereby making Kuala Lumpur's streetscape a inclusive and responsive urban space.

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# **Renewal of the Hangzhou part Grand Canal heritage**

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## ABSTRACT

*The Grand Canal in China connected Beijing and Hangzhou who plays an important role in the past years of China. Resident chose to live next to the canal before whose houses become heritage nowadays. Hangzhou, at the end point of the canal which flow through the centre of the city, faces many problems of the fusion of the modern city and old districts. There are three traditional blocks left next to the canal. This paper will discuss the different attitudes and problems toward the conservation, the methods during the renewal, the coordination considering of the overall image of the city in the future.*

## Keywords:

Grand Canal Renewal Hangzhou heritage

## PAPER TEXT



Pic 1: photo merge by Du peijun

The Grand Canal is the longest, biggest, oldest canal in the world, from Beijing to the north and Hangzhou to the south, cross Beijing, Tianjin, Hebei, Shandong and Zhejiang province. It is 1794 km length across Hai River, Yellow River, Huai River, Chang River and Qiantang River, which has almost 2,500 years history. The Grand Canal plays an important role in communicating economics and culture between north and south, especially for the agriculture and industry development and town evaluation.

Hangzhou part canal has a deep sense of history and human culture. The heritages still exist along the canal, including the old buildings and landscape. Nowadays, Hangzhou canal can be divided into three parts, traditional part, modern part and future part. The traditional part is in the north which reflects the old feature and life style most. There are three intensive old blocks in this part, named Qiaoxi Street, Xiaohu Street and Dadou Street. Each block have their own characteristic, and reserve some traditional buildings.



## QUESTIONS

In the rapid development of modern China, there must be plenty of new buildings replace the old ones. The traditional blocks will face many problems during the renewal of city. As culture heritage, we prefer to keep these blocks in memorial of the old life and old culture, especially when the government decide to apply for World Cultural Heritage. We all need to keep the original form and use them in a right way. But there will be some problems.

1. Functions. Keep them in the original form by repairing the structures and redecorate the inside space. But all the facilities are not as good as the new buildings. Therefore, people will not choose to live here as before, this space may come to a deserted and lonely place.

2. Authenticity. Hangzhou part canal, applies for World Cultural Heritage, must show the integral traditional features. So the government decide to connect the three blocks together by constructing some fake buildings along the canal. It is just like the landscape gallery which is not the really heritage. Actually, we can recall the Shanghai history by the StoneGate, the Beijing history by the quadrangle courtyard, but nothing by the fake old buildings, besides it's really a waste of place of only two storeys buildings in such a good place.

3. Harmony. Located along the canal across the centre of city, the three blocks are not isolate place, which must have some relation with the modern settlement. There are many differences between them, such as building mass, features, elements, colors. It is not easy to combine them together in a harmonious way. Usually, people consider the traditional blocks whose scale is close to human beings as the foreground and the modern skyscraper as the back ground, focus more on the old ones.



Pic 2: Before and after the renewal photo by Du peijun

## RENEWAL METHODS

Renewal of the traditional block, there are three idiomatic methods. First, genetic renewal, which means pick up the element and spatial composition that represent the characteristic of heritage, for example the quadrangle courtyard and try to maintain the

courtyard surrounded by four dimension buildings and the galleries which space flow through. This method is always used for duplicate or recovers important building features. Second, museum renewal, which change all the residential function to exhibition to show the old life style like antique museum, or use for some small bars and shops for people to sense, like Xintiandi in Shanghai. Many renewal projects use this way for commercial purpose. But this method cannot be used in a large amount of place. Third, organic renewal, which combine the former two way together. Make the old structure much stronger, redecorate the inside space and improve the facilities. Usually, people choose to make the first floor as stores selling some souvenir or snacks and the second floor as bedroom to live. Heritage along the Hangzhou canal use the second and the third method most.

Type	Landmark buildings	Public buildings	Proximate high-rise settlement	High-rise settlement faraway
Combination view				
Combination Analysis				
Suggested Colors	<div> <div>6699D</div> <div>1000H</div> <div>8800F</div> <div>8800E</div> <div>8800F</div> <div>8800E</div> </div>	<div> <div>8800F</div> <div>8800E</div> <div>8800F</div> <div>8800E</div> <div>8800F</div> <div>8800E</div> </div>	<div> <div>8800F</div> <div>8800E</div> <div>8800F</div> <div>8800E</div> <div>8800F</div> <div>8800E</div> </div>	<div> <div>8800F</div> <div>8800E</div> <div>8800F</div> <div>8800E</div> <div>8800F</div> <div>8800E</div> </div>
Coordinate Mode				

### COORDINATION

Pic 3: Coordination of different types draw by Du peijun

Between the traditional blocks and modern blocks, there must be a transition place which is considered as mid-shot. This place is used for connect two parts with different mass, style, and colors. Some is filled with large greenbelt which also creates some public leisure place. Some is filled with fake traditional buildings which also make some synthetic useful spaces. Others are filled with large industry factory which has its own features compare to the two different parts.

The traditional blocks are very similar to each other. We can do very few changes among them except improving the living quality and building facade. So the only thing

we can do is to find out the common features of the heritage and find out how to make the modern part next to them coordinate to the old ones.

1. Mass. Most of the old buildings are made of wood with two storeys. But consider of the requirement and intension of land, modern buildings are very large, both in plan and height. For this issue, it's difficult to coordinate them in the same level. We can only try our best to make the skyline continuously limitedly.

2. Style. Traditional buildings always have some details such as slope crest, pediment, eave and wood column etc. For the modern buildings, we can use the detail element try to make them harmonious, which must have some influence to its own style. Therefore, we only can add few decorations on the old or new buildings to make them integrate but cannot change a lot.

3. Colors. This element is easy to control. Old buildings are always with dark grey roof and dark brown or white walls, some with stone basement. New building can have several colors and easy to change. And according to the color planning research, we find out the most appropriate way is color hue coordinate. That means to control the old and new in the same color system in hue, and use different color system in brightness and saturation according to the requirement. Because old buildings always have very dark and strong color, we can easily make the new ones coordinate by the same color tone but separate them by different brightness or saturation.

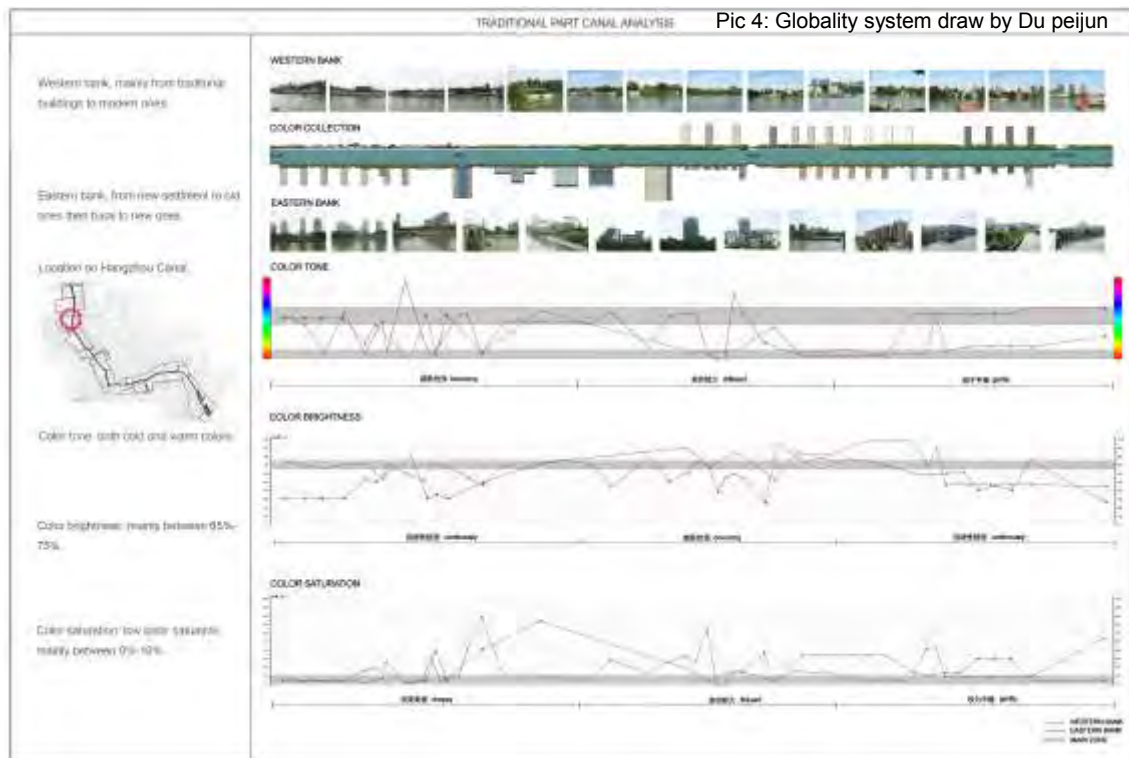
We find four different typical new building styles. First, important landmark buildings, we suggest use amount of glass facade to weaken its big mass, use a few materials of the old buildings foreground as ornament. Second, large public buildings like hospital which is not that tall, we suggest use high brightness low saturation colors with small ornament to compare. Third, proximate high-rise settlement, we prefer to use low saturation mid brightness colors with large greenbelt as cover. Fourth, high-rise settlement faraway which is better to be similar to old ones with high brightness and low saturation colors, like the background with less comparison.

## PRINCIPLES

In general, we have to face the paradox in the development of city between preserve heritage and building modern ones. In order to create a unitary abundant vivid city image, we try to find a way not break the original environment and give some principles on the renewal along the Hangzhou Canal.



1. Globality. Consider the heritage as part of the city and try to make the whole zone in one style system.
2. Continuity. Connect all the point along the canal together and give a continuous color mode to join them.



Pic 5: Continuity system draw by Du peijun

3. Hierarchy. Attract people's attention in foreground and leave the background to the environment. Divide them in different levels.



Pic 6: Hierarchy system draw by Du peijun

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# **The Universal House – a multidisciplinary approach to designing responsive and inclusive housing.**

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### **ABSTRACT**

*What happens when you sit an architect, occupational therapist, town planner, engineer and builder at the same table with a blank slate for housing design?*

*This paper presents a design case study. By looking at how people from different walks of life use residential spaces over their lifespan, applying social and functional values to the original design brief, and integrating architectural features, construction processes, transporting constraints and siting requirements into the design process, we are able to produce homes that are flexible and changeable throughout the lifespan of the building and the people.*

*We provide a design solution to housing that is inclusive and responsive to the fragility, complexity and diversity of life.*

### **PAPER TEXT**

The Universal House™ is a collaboration of architects, an occupational therapist, town planner, engineer and builder to deliver fully universal, wheel-friendly, sustainable, flexible homes.

We first met during Easter 2009 to discuss housing for disabled and/or disenfranchised groups who have traditionally not been well serviced by the private market or the social housing sector. This happened within the context of the Economic Stimulus Package, the “national conversation about disability” leading towards developing a National Disability Strategy, government reports on homelessness and mental illness and media coverage of Indigenous housing. Indeed, it was our opinion that despite considerable

political will and unprecedented funding, appropriate housing – to meet the environmental, economic and social needs of individuals and the community as a whole – was still not being produced.

From the beginning it was a “meeting of minds”. As an occupational therapist I brought to the group the social context of disability and vulnerability– the issues/ difficulties not widely known within the community about finding and maintaining appropriate housing; the residential context of the disability standards; the functional aspects of the built environment and how it can influence and impact on a person’s ability to perform their normal everyday tasks. Gabriel Poole (architect) is a genius with space. His ability to feel and “see” space, to pare things down to their simplest components while maintaining line and dimension is at the core of our ability to produce a building that has the breadth of flexibility and function of the Universal House. Malcolm Holz (town planner) brought the community context to our group - knowledge of planning schemes and regulations, relating the dwelling to the street, services and community. We each brought to the table a lifetime of experience and passion in challenging the status quo; recognising the need to provide a different type of housing and development. From each of our different sectors, we have seen innovative and worthwhile projects fail because one of the other sectors has faltered. Indeed with the value of hindsight, the strength of our collaboration and resulting designs lies in the integration of the architectural features, social and functional aspects, construction processes, transporting constraints and siting requirements.

The team targeted 4 specific groups of people who we believed were not serviced at all by the private market, and often not well serviced by the social housing sector. These 4 groups were:

- People with physical limitations - people with mobility difficulties, coordination problems, decreased sight, and well as people going through the normal aging process.
- People with disabilities and/or mental illness who need to live in close proximity in order to share support funding packages
- People with mental illness
- Indigenous Australians, especially in remote communities.

We looked specifically at their functional needs (in particular the health related literature), and the aspects of the physical environment that make it possible to do the normal everyday tasks that you or I might take for granted. In optimising the environment, we can maximize people’s ability to be independent, lead meaningful lives and contribute to their communities. We used the “person, environment and task”

model of occupational therapy practice combined with our collective experience of working in various housing, health, Indigenous and aged care organisations to develop functional briefs for each of these groups of people. We wanted to test the premise that if we designed homes for people at the “pointy end” of the spectrum of housing needs, we would come close to designing housing for everyone. In developing spaces that meet the needs of people with disabilities, we would also produce homes that make daily life easier and more comfortable for everyone who lives in them.

Our early discussions centred around “movement”: making it easy for everyone to move around – within the home, down the street, within the community - as life changes (sometimes dramatically and without warning, and at other times as our life stages evolve). We talked about moving people out of hospitals and freeing up beds so others can move in as early as possible; people with disabilities being able to move around in general without “special” (different) environments and entrances; having a home that makes it easier to manage with a temporary injury, such as a broken leg; homes to cater for our needs as we grow older, or if we have aging family or friends visit. We talked about the moving and growing population trends – the housing shortage generally as well as the changing demographics of housing needs.

Part of the brief was that the houses would not only suit people’s physical needs, but would also promote a sense of wellbeing. The World Health Organisation definition of health (that hasn’t changed since 1948) states: “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. We briefly discussed some of the research on the built environment and its effect on wellbeing. Gabriel summed it up beautifully when he responded with: “I’ve always thought that if people lived in beautiful houses they’d be happier”.

With quick turnaround times in mind, we quickly realised the benefits of factory built homes for our project. We contacted builders Jim and Penny Margach who had been working with Gabriel in developing “breathable walls” in factory built modules for remote locations. We also worked with Rod Bligh (engineer) to develop light weight roofing systems to connect the modules and enclose the spaces between modules.

We recognised that sustainability would be a key factor in our project. Environmentally friendly housing has traditionally been the preserve of middle to high-income earners, and yet low-income earners need it most to offset the costs of living. People with disabilities, mental illness or high support needs have ongoing (and often high) costs associated with medications and health services, and are less likely to be in long-term employment. With limited resources at their disposal, and often with severe financial constraints, they are least able to provide for ongoing housing costs - including basic



services such as utilities, maintenance and repairs. From a daily living perspective, it was also important that the houses were easy to clean.

There was also a very strong focus on long term sustainability – to the individual in having certainty of housing that will cater to their changing needs over their lifespan, and to governments and the community in providing housing that does not require the enormous cost of retro-fitting accessible features and assistive equipment as peoples' needs change, particularly as they age.

As we worked through the design process, we realised that the design brief items could be broadly divided into 2 categories – those relating to the building/module itself, and aspects or issues that related to how the modules were sited in relation to each other and/or to the street and community. And so, through paring down design to the essentials, taking into account life's stages and evolutions and developing modules that have the flexibility to be individualised, we realised we could produce a home that suited all the groups of people in our initial brief. And so we have produced The Universal House™ - a home for the diversity of people, households and communities in Australia.

### **The Design Solution**

Ans so, what does The Universal House™ look like? We have designed for modular construction to allow the flexibility required for “housing for life”. Each housing module is 3.6 metres wide and up to 15 metres long. The individual modules are structurally self-contained and can:

- Stand alone (be individually titled) on small lots
- Allow clusters of modules to be co-located and arranged according to the site characteristics
- Allow a home to be enlarged or reduced according to family needs and stages of the life span
- Connect in ways that allow the modules to have some shared facilities while maintaining privacy for individual residents
- Allow the relocation of buildings to areas of increasing demand from areas where demand has diminished. This results in efficient use of resources and minimizes the risk of vandalism to buildings that are unoccupied for long periods of time
- Allow modules/homes to be moved if geographic relocation is required (e.g. change in family circumstances or need to access services/support in a different location)

The simple curved roof that can span 4.8 metres with no interval structure can connect two modules, thus creating a spacious, insulated room that can be used alternately for indoor - outdoor living or secured, cosy activities.

We use factory construction to achieve quick turnaround times, minimize waste during the construction process and to deliver housing to areas where there are constraints on availability of local labour and materials. The building system can be delivered to site as flat packed building components or fully transportable buildings, whichever is most cost effective for the specific site and location. General low maintenance construction leads to fewer ongoing costs over the life of the building.

The patented wall system effectively acts as tubes of air pulling cool air into the wall cavities from under the house and expelling hot air into the specially designed roof ridge and expelled at the ends. This means there is no heat transference into the house. We have installed a number of houses in the tropics where, as a result of this wall system combined with cross ventilation, air conditioners are not required or their use is vastly reduced. In cooler climates the roof vent can be closed to trap hot air in the ceiling space during winter.

We use 19mm timber particle board for all internal wall linings – this is an extremely robust material and stands up to difficult treatment in challenging environments. It allows occupants to install heavy-duty fixings into walls where required. Importantly, grab rails can be installed on any wall at any angle without structural reinforcing.

The units have wheelchair accessible entries, rooms and car space. They are designed with circulation spaces that exceed AS1428.2 (enhanced design for access and mobility). The building system also allows us to design for the very small percentage of people who need extra large spaces for manoeuvring large wheelchairs and specialized equipment.

All the ceilings are engineered to accept ceiling hoist tracking up to 240kg; doors are designed for easy retro-fitting of automatic devices and grab rails can be installed on any wall at any angle without structural reinforcing. Our sliding doors can open and close where a ceiling track goes through the doorway. The bathroom design allows a bath with hoist space underneath to be fitted into the shower area without plumbing and installation costs.

Apart from the increased independence that ceiling hoists can give some people, health and safety concerns about the use of floor hoists in homes are likely to follow the trend of Australian hospitals and overseas support services where ceiling hoists are mandated. Currently the greatest cost in retro-fitting a ceiling hoist is in engineering and reinforcing existing ceiling structures.

We are working on a system of adjustable height kitchen benches with removable under bench cupboards. This is another feature that targets the changing needs of the building or the resident.

We have designed “accessible” door handles that allow sliding doors to fully recess into the wall cavity so that the full width of the door opening can be used. The handles can be used with all types of hand (dys)function, as well as using push/pull with arm, elbow or knee.

There is minimal disturbance to the land, particularly on sloping sites, with the house is sited above the ground. Homes can be fitted with solar panels, water tanks, and can be prepared for off-grid use.

### **Where to from here:**

Finalising a design and having partners ready for construction only completes the first stage of this project. We need to test the usability of our designs from the perspective of people living in the homes and for housing organisations needing to use the flexibility we claim to offer. We need to collect data on the internal temperatures in the homes over time, on maintenance costs and on the use of alternative energy sources within the homes.

There is little research that correlates the physical housing environment with health measures such as visits to doctors, admissions to hospital, support hour funding and to life satisfaction measures. Some initial research in the fields of spinal injury and mental illness appear to show positive correlations. With the current trend towards vastly increasing applications for community support, this information will be critical for well-informed policy and decision-making in the housing and disability sectors. We would like to extend this type of investigation to include the benefits to all individuals - and to communities - of living in beautiful homes that have been designed to enhance wellbeing.

During our discussions we were often reminded of the fragility, complexity and diversity of life. We hope our designs provide a solution to the need to develop inclusive and responsive communities.

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# **CREATIVE COMMONS AND THE FUTURE CITY – A LIFE HUB**

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## **ABSTRACT**

There is an opportunity for Urban Designers to integrate the impending reality of scarce global food resources into a coherent plan for a “People Centric” sustainable resilient city. A Creative Commons (Life Hub) is a part of the continuum of food from farm to fork and space from flower boxes to fields. Creative Commons is a Planning Term used to designate Open Space in a City/Urban setting that focuses on the natural capital but especially food. The food focus includes education, production, preservation, preparation, presentation and promotion; the people (social) focus includes human senses, needs, behaviour, food security and social rules (governance); and the creative focus is as a “Life Hub” with multiple interacting educational and cultural activities and “Fiestas” to maximise the value of the open space. It is part of the city system to minimise the impact of climate change and food security

## **CONCEPT DEVELOPMENT**

The reduction of land around houses in cities has restricted a families’ access to grass for playing and exercise, gardens for food and flowers, Hills Hoist and the backyard shed for creativity. Cities provide play areas and open spaces to compensate this loss. We propose a design to consolidate and maintain these areas as a shared and professionally managed asset, a “Creative Commons” with food security. We can build cities but can we build lives?

It is “compensation” for the loss of space but adds significant opportunities to develop individual and community relationships and entrepreneurship. It minimises a financial burden on the community by operating the Commons as a “Not-for-Profit” institution. It provides practical working space for financial sharing or exchanging skills and assets in production, retailing and cultural activities. It focuses and educates the community on the real natural environment and its products especially food and organises events that maximise the personal interaction with each other to develop community trust and culture.

The urgent need is for the disadvantaged to have easy economic and physical access to the space to enjoy and use it, to mix with the community and to have financial access to the programs. This is the central theme of the concept. The market will ensure rich people are fed, but Food Insecurity will need a solution, both in Australia and internationally and the Creative Commons is an approach. The food continuum has other urban design features such as Food Storage/Distribution Hubs, Community Gardens, Farmers Markets (Retail), Restaurants, Food Precincts, Profitrons and Open Fields to deliver food to all citizens.

## **CREATIVE COMMONS DEFINITION**

Local open space that facilitates neighbourhood development and human evolutionary progress (measured as social capital) through inclusivity, creativity and entrepreneurship.

Inclusivity: Includes all cultures and the advantaged and disadvantaged (including financial).

Creativity: Place for humans to meet share, dream, do, reflect and evolve.

Entrepreneurship: Individuals taking responsibility and creating economic opportunities for themselves and others. Franchising the disenfranchised.

## DESIGN FEATURES

The Design is for humans, with the eye of a “landscaper” and our philosophy (nature) of “fresh air, fresh water, fresh food, fresh sunshine, quietness and vistas”. The human centric approach includes the following 5 models of key areas impacting the human activity in cities.



It is based on knowledge of how people spend their time, their money and balance their lives and how this can be improved to enhance their individual and collective wellbeing.



**LifestyleBalance**

HomeNet

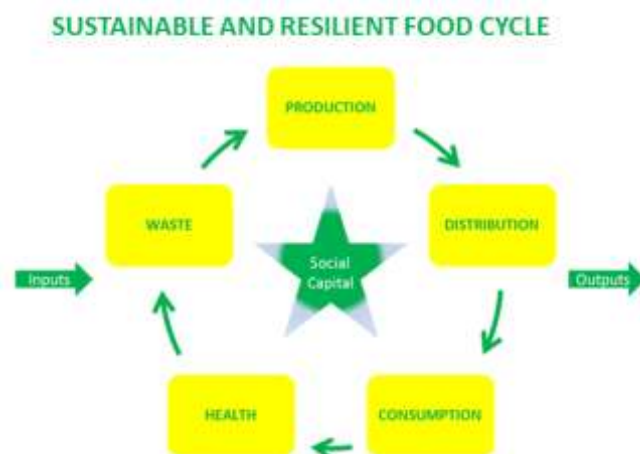
**Creating a better balance between Work & Home Life**  
 The rewarding journey to happiness & peace of mind  
 HomeNet gives you the tools to **take control** of your life.

Income		House		Hobbies
Investment		Clothing		Education
Loans		Collectibles		Skills
Expenses		Furnishing		Training
Superannuation		Car		Career
Financial	Biological	Physical	Relational	Intellectual
	Health		Spiritual	
	Grooming		Community	
	Fitness		Family	
	Recreation		Pets	
	Food		Employer	

The design generates and enhances social capital, with trust a basic parameter and includes social behaviour (Governance) in relation to 5 levels, individual, networks, business, community and biosphere. The design uniquely includes behaviour as part of the design to allow individuals freedom of action to maximise creativity and integrates it with responsibility for their actions with an action management system.



The approach integrates the food cycle (and 5 key areas) and includes knowledge of the health and environmental impacts of foods, the Food and Environmental Pyramids.



Four layers of organisation and management are recognised, modelled and managed; natural, social, physical and financial capital.



## METHODOLOGY

The start is to define a space by both its physical boundaries and social boundaries. Best practice business techniques such as those of IBM are then used to build the Commons.



It is about **Partnerships**: It is recognised that many other partners will be involved in building the community, especially Councils, and the contribution of other parties will be matched with the Life Hub to provide the best mix, as shown here at the individual level. The natural, social, physical and financial value of the community is determined and goals are set to increase all capital values of the community, but especially financial ones and the cash flow. Age, culture, country (200 in Australia, all “out of Africa”) training, background or experience of the individuals is not a concern (an opportunity) with the result e.g. the Mamre Life Hub



The Creative Common is about **Collaborative Consumption** “Product-service systems that facilitate the sharing or renting of a product (i.e., land sharing); Redistribution markets, which

enable the re-ownership of a product (i.e., food); and Collaborative lifestyles in which assets and skills can be shared (i.e., co working the knowledge and space)

It is about **Events**: Outdoor Concerts: Open-Air Cinema: Dramatic Festivals: Cultural Festivals: Farmers Markets: Community Markets: Food Fairs: The Arts: Regional Promotions; Food Promotions.

A green field site is preferable as it provides the most efficient way to build a Life Hub



The food continuum includes Food Storage/Distribution Hubs, Farmers Markets (Retail), Restaurants, Food Precincts, Profitron, (Carbon Forests) and Open Fields, outside the city.

It is about **Food**: Food Security issues are emerging as a major global risk factor and our job as Urban Designers is showing policy makers how to reduce the impact of food security and climate change on supply. City towers 600m tall (Food Tower, sunlit or not) with a 3ha footprint, could produce basic food for 100,000 people, but it is not needed yet, try a Profitron. We have answers to most of the issues of land scarcity, water, nutrients, energy climate change, education and lagging technology for example in the Bennelong Profitron.

#### ISSUES AND SOLUTIONS –TODAY, NOW, IMMEDIATELY

Land scarcity: Use "Profitron" (glasshouses) to boost productivity 10\*, Locate near consumers  
Genetics: Focus on vegetables and fruit. Use existing varieties, breed better ones, new species  
Water crisis: catch rain water, recycle water inside glasshouse, exploit evaporative cooling  
Nutrient losses (and availability), N2 fixation, P, S, recycle  
Energy dilemma: solar panels on site, minimise chemicals by disease and insect control, LED's  
Climate & Environment (carbon price): take climate out of equation, design sustainability in  
Education: Communities - Life Hub; Politicians - Information; (Speculators: Regulate)  
Lagging technology: Can't wait for Science (10years). Use what we have now and improve.

#### TRENDS IN FRESH FOOD BUYING BUY (EAT) LOCAL



#### BUY LOCAL, EAT FRESH – Great Reputation

Source: Profitron  
Local reputation  
Fresh reputation  
Cheaper  
Healthier  
Sustainable and healthy  
Local produce  
More control over food quality and safety  
More control over food quality and safety

Enhances profitability and reputation:  
Price premiums: Better margins  
Lower fuel and transport costs  
Less exposure to fuel cost changes  
Less exposure to transport costs  
Reduced double handling costs  
Reduced losses for damage in transit  
Better response time to customers

#### RISKS: TRENDS IN REGULATIONS



#### FRESH FOODS ARE AT LEAST RISK

#### ENVIRONMENTAL RISKS MINIMISED-

Improves plant productivity  
- Higher yields (10% increase)  
- Better quality yields  
- Better reliability quality  
Improves labour productivity  
- Accurate labour input and output  
- Better working conditions  
- Greater security  
- Less stress due to weather  
- Better quality staff

By Glasshouse Production





## New Systems Needed for Food Security and Insecurity



We recognise the nature of systems and new systems are needed for food and the Life Hub can impact many of the critical aspects of the Davos model of global risk. The need is to apply the proven ecological principles to all land, especially food lands; 800 years old, upgraded degraded land or virgin land. The Creative Commons extends it to urban land.



Plants also stimulate the visual senses in gardens, on streets or in roundabouts.



Or that the same open space has value for expressions of creativity that are mind boggling; “Impressions” on the Liang River or those of Christo and Jeanne-Claude in Central Park, NY.



A resilient city needs a legacy. Its assets improve people’s lives even when times get tough. Examples of this robust and lasting fabric include the urban park systems designed by Fredrick Law Olmstead in the U.S.A. and the marvelous architecture built during wealthier times. The Creative Commons is a dynamic substrate for urban agriculture. It challenges our imagination about how food and plant production, and associated activities, can be programmed and managed in many ways for generations to come. It is a source of plant and food knowledge available to all, but above all a community asset to generate trust.

## **Towards new approach of tourism development of historical sites**

### **An Empirical Study for the El Darb El Ahmar area**

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#### **Abstract:**

National governments have recognized the potential of tourism for regional urban and economic development; especially for regions of relative economic backwardness. A new approach used addressing the dynamic perspective of the development process of tourism through upgrading the socioeconomic conditions of inhabitants of historical sites.

However, such improvement aimed to communicate tourists with inhabitants of historical place by introducing variety of outstanding attractions with the existence of living environment, which reflects the history, and culture of such places. The general methodology of the research based on several stages. The first phase is to study the life style of the community of historical sites and their activities. Then highlighting the potentials and constrains of such areas through SWOT analysis. The second phase is addressing the potentials and resources of attractions with unique archaeological and cultural remains representing a sparkling potential market in tourism. The outcome will be scheme of tourism development of historical sites and involve the living environment of the area to achieve the objectives of this research. Such strategy applied on historical site with unique architectural style, including dynamic environment to reach the ideal plan for the study area

The study area "El Darb Al Ahmar" is one of the ideal areas for development of tourism applying the new approach. Aiming to drag such areas on the historical map of the city without the evacuation historical sites, many workshops to educate inhabitants the importance of historical sites on national income and enhancing the urban of fabric of the society.

**Key words : Tourism Development- Historical Sites- El Darb El Ahmar**

#### **Introduction:**

Tourism is a social and economic phenomenon that was accompanied with dramatic circumstances emerged clearly in the latter half of the twentieth century has become in many of the world's most important economic sectors in terms led to a change in work patterns and living standards and income distribution as the expansion of tourism activities accompanied by cultural changes and social, environmental and technology associated with the post-industrial

And has made clear that the environment in which to grow the tourism of great significance to confirm the level of quality and success of the travel experience

concerning the tourists and whether a natural environment such as land, water, plants or man-made and which includes the effects, and historic buildings, roads, etc. and in the absence of a clean environment for attracting tourists, tourism rarely succeed And within the scope of economic methods different to fit the environment in planning and environmental management of the different, the concept of sustainable development is best to face the negative aspects of development and to seek common ground in the future as the concept of sustainable development will continue to be thought leading to the development processes during the first century and the twenty in all economic sectors, including tourism sector (1)

El Darb El Ahmar suffers from the weakness commonly found throughout Islamic Cairo ( and many other historic city centres in developing countries), the combined result of a series of social economic and physical factors:

- Low family incomes and an economic base that often lags behind development in newer parts of Cairo
- A deteriorating housing core resulting from unrealistic planning constraints, pending demolition orders, limited access to credit and widespread insecurity of tenure
- Continue deterioration of monuments and historic structures
- The consequences of the 1992 earthquake and lack of public investment and regular upkeep of city infrastructure
- The absence of essential community facilities and services

## **1. Research Objectives:**

### **1.1 The main objective:**

The study aims to prepare a development plan for the region of El Darb El Ahmar includes a set of functional areas containing restoration on a range of tourism activities that can be formulated in the form of specific sites and areas and detailed programs can be put on investors

### **1.2 Secondary objectives:**

- Study the current situation of the region and what is included in the geomorphologic data necessary for the preparation of the outline
- Development of the pillars and foundations of the region, schematic Acting on the basis of the overall strategic concept and proposed policies for development
- Develop a schematic program that contains the elements and the functional activities of the proposed scheme
- The preparation of several different planning alternatives in terms of thought and planning and achieving the targets laid down the foundations for the planning area

## **2. Methodology of the study**

### **Overall strategy and development policies:**

- Development of the region within the framework of the strategic concept of public and interactive relationships with national and regional levels
- Rely on the pillars of the initial planning emanating from the analysis of situation and target development in the simplest way
- Reliance on the policy of gradual growth cumulative

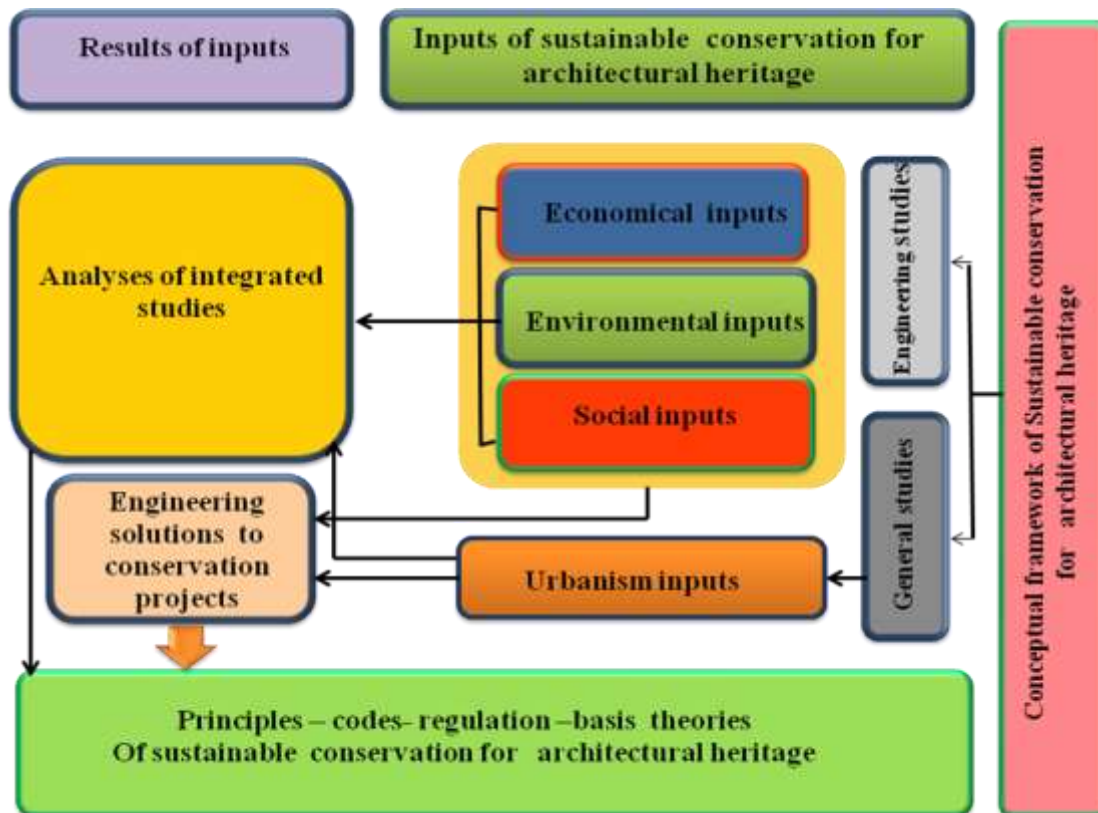
Cost-effective sustainable tourism development areas of the historic

Tourism development areas of the historical sites has a sustainable yield is in the range of themes of economic, environmental and social

- First, the economic return of tourism development areas of the historic
- Secondly, the environmental impact of tourism development areas of the historic
- Third, cost-effective social development of the tourist areas of the historic

#### **The main elements of Methodology :**

- a . Empirical study of the concept of tourism development through a review of the concept of development and mechanisms according to the application site area to be developed
- b.A Field Study of El Darb El Ahmar in terms of tourism potentials and opportunities for development through knowledge-dimensional heritage and tourism to the region and supporting the tourism development process
- c . An analytical study to extract tourism development scheme for El Darb El Ahmar through the analysis of areas of strength and weakness and learn opportunities through



**Fig ( 1 ) Methodology of the study and Conceptual framework of Sustainable conservation for architectural heritage**

### 3.WHAT is Heritage? (2)

Heritage means something that has been inherited. The word includes the concept of transmission from the past to the future.

Heritage must be considered a legacy that we receive from our ancestors and have to pass on to future generations.

### 3.1 Cultural heritage(3)

It is the creative expression of a people's existence in the past, near past and present.

It tells us about the traditions, the beliefs and the achievements of a country and its people

There are two kinds of cultural heritage: (4)

a-tangible: material heritage (it can be physically touched) such as: monuments, buildings, statues, paintings, objects).

b- Intangible: deals with immaterial heritage such as: Music, dance, literature, theatre, languages, know-how, religious ceremonies, traditional performances.



### Figure (2) Element of Heritage

It is common that a cultural heritage item combines one or more of the following categories(5)

- |                                      |                                  |
|--------------------------------------|----------------------------------|
| 1- Architectural works and monuments | 2- Historical centers            |
| 3- Groups of buildings               | 4- Museums                       |
| 5- Archives                          | 6- Libraries                     |
| 7- Archaeological sites              | 8- cave dwellings                |
| 9- Cultural landscapes               | 10- Historical parks and gardens |
| 12- Industrial                       |                                  |
| 11- Zoological and botanical gardens | archaeology                      |

### 3.2 Natural heritage includes:

- 1- Landscapes of natural beauty,
- 2- Geological and physical formations having scientific or aesthetic value,
- 3- delineated areas that constitute the habitat of threatened species of animals and plants such as natural or maritime parks.

**Table (1) comparison between Cultural heritage and Natural heritage (3)**

CULTURAL HERITAGE		NATURAL HERITAGE
TANGIBLE HERITAGE		TANGIBLE & IMMOVABLE
Immovable	Movable	
Architectural works Monuments Archaeological sites Historical centres Groups of buildings Cultural landscapes Historical parks & gardens Botanical gardens Industrial archaeology	Museum collections Libraries Archives	Music Dance Literature Theatre Oral traditions Traditional performances Social practices Know-how Crafts Cultural spaces Religious Ceremonies etc.
		Natural or maritime parks of ecological interest Geological and physical formations Landscapes of outstanding natural beauty

### 4. Mechanisms for the development of tourism to historical sites: (4)

- a. Putting the region within the historic tourism program
- b. Media attention and advertising about the historical and monumental sites
- c. To provide network transport and support waiting areas surrounding the sites as loading points for tourists
- d. Providing the necessary services for tourists (toilets - houses gifts - cafeterias) and documentary films about the region
- e. Connecting the surrounding context to create touristic tours for the visitors and draw a clear map about its
- f. Establishing a distinct multi-level hotels in the vicinity of the historical area

Through Studying the population demographics of El Darb El Ahmar it was found that the effective labor force constituted 62% in the age group (20-50) in this force and is considered a strong human

### 5. The importance of tourism development. (4)



Tourism development is one of the objectives of economic development and comprehensive social because of their ability to improve the balance of payments and to provide jobs and create income-generating opportunities, as well as contribute to improving the style and pattern of social and cultural life of the general members of the community.

The growing interest in tourism push to increase its role in development in terms of promoting investment in the establishment of tourist projects in the framework of tax exemptions on imports of Tourism will also provide important opportunities for the contribution of States in the establishment of infrastructure projects in the country and the tourism sector is a pioneer in the creation of entanglements with the rest of the branches and the economic activities where forward and backward linkages of the sector.

Basis of the above can be pointing the importance of developing the tourism industry through:

a - improving the balance of payments: through the flow of foreign capital for investment in tourism projects, as well as through the good uses of natural resources and would achieve the tourism resources as a result of finding economic relations between them and other sectors in the country by the state of economic benefits in terms of income earned from foreign currency from tourism demand for outbound tourism as well as internal, which contributes to increasing the gross national product of the state directly and indirectly and thus contribute to the process of economic construction as well as achieve the industry's recovery from large segments of society.

b - Providing job opportunities and solve the unemployment problem .. So that the expansion of the industry

Tourism and related projects would contribute to providing new job opportunities thereby reducing unemployment and thus lead to a high level of income and welfare of society and increase the rate of growth of spending tourists and the direct impact of tourism to provide jobs to be first of the tourism sector of the sectors associated with it.

c - Increasing the opportunities for profitable investment the state can identify broad areas for investment in this sector, including work on the exploitation of the good elements of the Advancement of reality tourism, where investment and employment of national capital and foreign direct it towards areas economically lucrative as owned by the private sector's ability to strengthen the competitive advantages of tourism projects and find possible means to attract tourists and the introduction of the best types of techniques and equipment and improve the methods and the performance and tactics that work here will require the supervision of the State to formulate comprehensive strategy one of the main elements of the terms of the private sector and its role in tourism development.

d - to achieve balanced development between regions result in tourist development to distribution and the establishment of tourist projects in new provinces of the country's different, especially as sites of cultural, archaeological and religious distributed between different parts of the country from north to south, which means a balanced development of the provinces, especially the underdeveloped them economically by

finding work and improving the standard of living to the people of these areas and increase well-being of individuals and the exploitation of natural resources in the provinces, would entail the distribution of income between regions or provinces, and achieve a state of economic balance and re-distribution of income and the development of these areas as places to attract population and thus the possibility of reducing migration from underdeveloped areas to the more sophisticated as Tourism contributes to the recovery of human settlements served or where there is proximity to tourist infrastructure and also contribute to a deeper cultural awareness among citizens and stimulate the development of road network to cover new areas. Underdeveloped areas to the most advanced as contributing to tourism to revive the human settlements served or where there is proximity to tourist infrastructure and also contribute to a deeper cultural awareness among citizens and stimulate the development of road network to cover new areas.

Accordingly, we find that the interest in this sector and in several important tributary of the development process is the input for sustainable development, exploit the potential of the tourism industry and especially religion and give the home entitlements historical, as well as the development of the country's foreign relations as to improve the economic status of the State as a center of culture and radiation cultural and literary.

e - As for religious tourism - is deemed an important economic resource at this time must accommodate the task of visitors and tourists and to find and create the infrastructure, equipment and accommodation and hospitality, considering that the holy sites can contribute in enhancing the general state budget and then lead to the recovery of income for large segments of society because of its foreign exchange contributes to the achievement of a supplier of hard currency will help stabilize the Iraqi currency and increase its value, thus improving the exchange rate, as well as the religious tourism her to do them is clear in the operation of labour and reducing unemployment and diversifying sources of national income - on the other hand can contribute to religious tourism in stimulating trade and increase the aggregate demand for goods and services, including increasing the size of the economic development and growth rates of per capita income and national income in the trade and services sector as well as that of this tourism is a source of the definition of civilization, Arab and Iraqi self and make it able to reverse the values high-end of the Muslim religion and society.

## **6. Tourism elements:**

Tourism development is one of the most attracted approaches for cities that are rich with historical buildings or sites. For example UNESCO has listed Egypt as one of the first five countries that needed conservation as it contains one third of the Islamic heritage

### **6.1Attractions:**

#### **5.1.1Natural attraction:**

Some of the countries are characterized y the distribution of historical buildings and sides along the city, which facilitate planning for historical trips and transform the city as an alive museum presenting different architectural styles and the identity of people lived there. This will lead to the activation of tourism.

#### **6. 1.2Man made attraction:**

Human resources who are presented in artisans' efficiency that appears in collection sold to tourists at the same time integrated social life, which interacts with tourists. For example, Luxor and Aswan in Egypt with their social life that attracts tourists in addition to recreational areas distributed along historical sites such as Bazaars, cafes and restaurants.

### **6.1.3 Attraction management and control:**

It is considered one of the most important elements for tourism development, which are represented in the regulations, and laws set by governmental or nongovernmental organizations that are responsible for historical sites as touristic approach such as Tourism ministry, cultural ministry etc...

## **6.2 Facilities**

They are group of services supported for touristic countries to serve tourists such as accommodation and supporting industries

### **6.2.1 Accommodation**

Appropriate places for accommodation of tourists are very important and they must imply certain conditions:

- Different living standards to suites different types of tourists (Guest house less than 10 rooms- small hotel less than 100 rooms- large hotel over 100 rooms)
- To be as near as possible from touristic monuments

### **6.2.2 Supporting industries**

Besides accommodation, the tourist will require a range of supporting industries. It includes catering and shopping, sport and recreation and entertainment. These facilities can be either the main attraction for certain classes of tourists or they can be supportive of the overall tourism industry in an area.

Support industry holds an important key to the success of a tourism destination. One important value lies in providing enough activity potential so that the length of tourist stays will be extended, and the longer tourists stay the more they spend

## **6.3 Services**

Services must be supplied to historical sites or buildings and at the same time to serve accommodation of tourists, which attracts tourism such as transportation and infrastructure

### **6.3.1 Accessibility**

To develop a destination for tourism, it has to be readily physically accessible. Physical accessibility largely depends on existing land use, infrastructure, and the location of access routes and possible modes of travel to and within the destination areas. Transportation face two main issues whether there are legible loading points or not, available parking areas for touristic trips or not. The second section different types of vehicles available and all can easily reach historical sites or some sites are not applicable by special types of transportations.

### **6.3.2 Infrastructure elements**

The term infrastructure refers to all those built-in services, which are essential for modern social life and economic development; they include transport facilities such as roads, railways and airports, water supplies sewage, electricity and gas supplied for historical areas. How this distribution satisfies new requirements of inhabitants without affecting historical buildings badly accelerating its demolition. This facilitate movement of tourists through monumental buildings easily.

The transportation system improvement is one of the main reasons that have encouraged the development of recreational tourism. It has provided the means for more people ( mass tourism) to travel and reach new destination which usually famous for its unique nature.

## **7. Barriers to Tourism Development:**

Vary the ingredients for the tourism industry varying degrees of economic progress and civilization in the world and in Iraq surrounding the tourism industry, many of the obstacles and problems that led to the shrinking of the role of tourism in the areas of economic and social development and, although the contents of Iraq's resources and assets for the advancement by tourism, the tourism industry has not received the attention

Required, there are a number of obstacles and challenges still facing tourism development should be addressed, including:

a - Lack of a clear strategy on tourism and the prospects of its development can be required to indicate the national level, regional and local levels in areas of economic, social, environmental and cultural heritage and the lack of visibility of tourism.

b- Lack of tourism development in the site development plans, which reduces the importance of continuing in the framework of the modest financial allocations for tourism, reflecting the lack of projects completed or planned and the poor performance of public policies in the adoption of a clear strategy for tourism.

c - poverty is clear in the data and information, tourist information and statistics. Where the absence of a good system of information and tourism statistics.

d - the modest quality of facilities and services and the weakness or lack of basic facilities and services such as roads, electricity, telecommunications, and sanitation.

e - humility and lack of educational institutions and the low level of qualification and training of the high proportion of staff and inadequate training programs, tourism and hotel for the advancement of the level of services and tourist facilities that require a qualified work force.

f- humility, awareness of tourism and the failure of public awareness of the importance of tourism to most citizens.

g - weak and inadequate and irregular land and sea transport, air and lack of access roads to the developer of all the sites and attractions.

h - modest plans for promotion and marketing of tourism and lack of government funds allocated for marketing, research and statistics and tourism information.

e - low and low level of hygiene in the cities and tourist areas of archaeological and

inadequacy of public utilities and garbage treatment system under the low awareness of tourism.

l - traditional tourism programs and non-existence of which stands a barrier to prolong the stay of tourists.

m - neglect of the archaeological areas and urban cities, especially religious sites and historic buildings, there are shortcomings in maintenance and restoration, reconstruction and further exploration work, as well as the absence of a system programmer to visit and to increase and attract tourists to these areas.

n - insufficient means to curb the smuggling of antiquities and historical objects or returned, helping to exacerbate the problem and undermine the tourist attraction.

Basis of the foregoing that the reality of tourism and antiquities in Iraq indicate the presence of real challenges to be faced, there are sites of archaeological mission threatened disappearance of a beacon of humpback in Mosul and Taq in the cities and twisted Samarra, as well as historical symbols of Arab and Islamic countries and the threat of the ongoing security of the tourist sites of religious and loss and loss of many of the pieces archaeological ancient in the foot and the weakness of the amounts allocated for expenditures for maintenance of monuments that were destroyed, as long military confrontation a lot of tourist facilities and archaeological and resulted in the fall and the collapse of many cities in the archaeological rich sites, the task that represents a turning

point in Arab history and Islamic world and a landmark for the civilization of Mesopotamia and the Abbasid Caliphate and turn most of these sites to military sites.

**Fig (3) business activities and crafts added goats Street area after the development**



**Table (2) comparison between Tourism traditional development and Sustainable tourism development(2)**

<b>Tourism traditional development</b>	<b>Sustainable tourism development</b>
<b>General concepts</b>	
Rapid development	Development occur on phases
No limits	Certain limits and capacity
Short-term	Long-term
Depends on quantity	Depends on quality
Management of development processes from the outside	Management of development processes by the local population
<b>Development strategies</b>	
Development without planning	Planning first then development
Planning partially for separate sections	Comprehensive and integrated planning
Focus on the establishment of units for the holiday	Taking into account the environmental conditions in construction and planning of land
Traditional urban building	Local urban patterns
Planning programs for projects	Planning programs based on the concept of sustainability
<b>Tourist specifications</b>	
Large number of tourists	The movement of individuals in small groups
Short periods of residence	Long periods of residence
Noise and disturbing sounds	Sobriety and calm in the performance
Often one visit to the place	The possibility of repeating the visit back to the place
Levels of different cultural	High level of culture and education

#### **8.Case study El Darb El Ahmar: (6)**

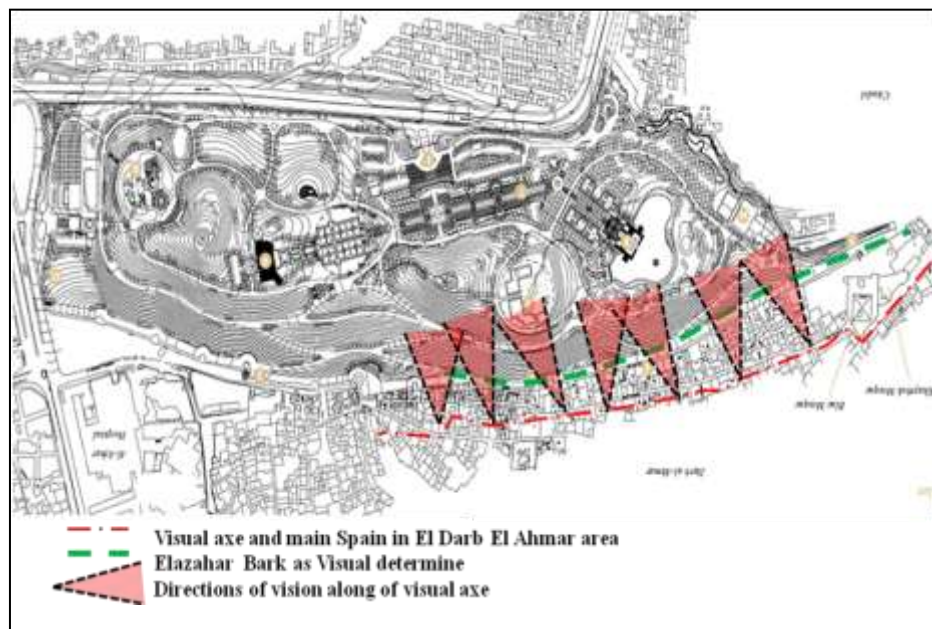
**Location:**

It is located at the Fatimid Cairo where it is bordered from the east with Mamluk's desert and Salah El Din's citadel while from west with El Megharbeleen and Port Said Street. From North with el Muez Street and forts of Salah El Din stretched from the citadel. While from the south bordered with El Sultan Hassan's Mosque and Mohamed Ali Street.



**Fig**

#### **(4)The notes and main axes of El Darb El Ahmar area**



**Fig (5) Visual orientation of the El Darb El Ahmar area**





## **Fig (6)The ayyubid city wall as determined edge**

### **Historical background: (7)**

It was named "El Darb El Ahmar" due to accommodation of this area with Roman people with red faces who joined El Guhar's army to conquer Egypt at the beginning of the Fatimid reign.

The district represents the largest number of historical buildings in historical Cairo. It contains about 14 historical buildings representing most periods of the Islamic reign in Egypt which are considered one of the main sources of the cultural wealth.

Concerning the urban fabric of El Darb El Ahmar it is homogenized where it is bordered by Ayyubid fortress, stretched along Bab El Wazir Street till the east at Bab Zewila.

### **Determinants to deal with historical characteristics of El Darb El Ahmar: (8)**

To study this area a matrix must be prepared to examine the multiple inputs to deal with the historical buildings there, which are:

1. History of the buildings
2. Structural system of each building
3. Value of historical buildings
4. Surrounding context
5. Visual continuity
6. Possible treatments

Characteristics of such area or sustainable development depends mainly on socio-economical aspects of the area for future development.

### **Sustainable development tourism of El Darb El Ahmar (9)**

Sustainable development plan for El Darb El Ahmar depends on preserving monumental buildings and its relationship with contemporary socio-economic values, which means revitalization of the traditional values.





**Fig (7) Elmahrouk mosque as a sample of heritage building in the El Darb El Ahmar area**

**Urban conservation:**

1. Converting the historical city and the urban fabric into new function, historical value and economic return by reusing the historical buildings to serve inhabitants and tourists at the same time through educational and cultural centers
2. Providing fund for the management of buildings such as the reuse of school of Darb Shoughlan as socio-cultural center.
3. Designing public open spaces to be as a center of cultural events or meetings such as folk arts festival, children exhibitions
4. Al Azhar Park is a practical model to convert the dilapidated areas to cultural centers for historical districts. The execution of the project took place without destroying archaeological sites
5. The Ayyubid wall was considered as a linking element between Al Azhar park and El Darb El Ahmar and used as shopping elements for the historical district
6. Residential buildings has been restored and reused to satisfy the inhabitants needs

**9. conclusions**

A. By exploitation of cultural and historical tourism resources can solve many urban problems, and to ensure the continued development plans proposed, the captives population of those areas

B. Study has introduced a new addition this research to the fields of science and practice of urban development continued to deteriorating urban neighbourhoods through the exploitation of tourism development and conservation area

C. The economy a major factor in urban planning studies for areas of heritage tourism in order to benefit the maximum value from their development, and development and the creation of economic value that is supportive of an area on the level of communities, and the heritage buildings.

D. Traditional areas of nature tourism need to raise the level of services and facilities and infrastructure, improving living conditions and give a better picture of the population because they are a key component of the region and constitutes

the distinctive character of heritage.

E. Work to create areas of new housing for residents of the areas adjacent to the traditional heritage area, which could take advantage of the old residential areas either substitution or replacement of the terms of use or function.

F. El Darb El Ahmar area need to association system of activities and uses are compatible with the level of social, economic and directed towards activities with economic value is useful to the people of the region compatible with the character, such as traditional works (copper work - the work of fabric)

G. El Darb El Ahmar area need service activities consistent with the nature tourism heritage represented in the communication centers, hotels and restaurants to serve tourists distinctive visitors.

H. El Darb El Ahmar area need the services of its facilities and upgrade facilities, infrastructure, and use of meaningful employment hub for the historic Cairo and the development of areas adjacent right and left for development, creating a space additives.

I. Attention to activities and uses of nature, daycare and evening stage to support and develop an area of common goats future which creates life and movement within the region to maintain effective communication

## **10. proposals and practical recommendations to improve the rate of Tourism**

A .In light of the situation and the problems experienced by the tourism sector and in part characterized by.

B. Elements of the tourist industry promotion of this sector generated income-generating opportunities and solve the problem of unemployment and the economy can improve by pointing a number of recommendations which they can bring development plans and operations of such a process (implementation capacity), which should be characterized by.

C- identify the agencies responsible for environmental protection and natural resource development and through coordination between the Ministry of Tourism and the Ministry of Environment to preserve the cultural heritage (the effects of the museums and tourist sites of ancient and religious), as posed by the nature of importance as one of the elements of the environment and the necessity of protection and development.

D - Development of small-scale industries and craft heritage of nature and those associated directly with the support of the tourism industry and to identify sites for

safe investment and tourism and provide the means to set up the pose of the importance of nutrition and links to tourism.

E - support the infrastructure and the completion of the institutional structure - legislative and enforcement of laws regulating tourism.

F- to revive tourism promotion and organization, including the programming education official and popular, and the issuance of the tour guides, magazines, movies, guides, maps, as well as developing the use of visual aids, as well as the use of diplomatic missions at home and abroad and the establishment of periodic exhibits the potential of tourism, especially as the tourism promotion steps, represented by field survey of sites tourism and urban development schemes for their development and environmental studies and observation of population density, which means the proposal to establish Tourism Promotion Board to take it upon himself to this task, which requires the development of an integrated information base to ensure the availability of basic data accurate and specific about the elements of tourism and its components.

G - The Ministry of Tourism to identify and appoint investment opportunities to promote tourism and stimulate and activate the role of the private sector and businessmen to attract capital into profitable opportunities and to maximize the financial incentives and economic development in the field of tourism investment as well as the development of administrative facilities and shorten the time and the necessary actions in a framework of transparency for vacation tourism projects.

H - speed up the introduction of amendments to the regulation of tourism to become the organization of the Ministry of Tourism and Antiquities, bodies and departments in the provinces or regions organized organically works as a system-way marketing is able to keep pace with the rapid development of relations, international tourism requires the selection of elements of efficient and trained manpower and specialized.

L. Monitoring of the financial allocations necessary to proceed to the advancement of tourism in development plans and programs and development and through the survey accurately and comprehensively about the potential of tourism and ensure the participation of national and foreign expertise in this regard as well as supporting material resources of the General Authority for Antiquities and Museums and manuscripts in order to enable it to develop archaeological sites list to culturally appropriate level and increase the number of regional museums and the expansion of exploration and the maintenance and repair in the new areas of archaeological and historical list and reveal more of them and expand the size of tourism services and deepen its contribution to enrich the tourism in the country.

M. To improve the reality of tourism services and private systems and ways and means of transportation, internal and external communication. That requires the State an active and influential role.

N . activation of tourist activities and the preparation of programs and in coordination with the offices of travel and tourism, domestic and international adoption promotion and advertising as one of the most important elements of the

marketing mix.

O. festivals tourist - cultural and periodically in the tourist attractions and in coordination with authorities and relevant departments, both at the local level Or international.

P. Tourism Training as a key element of the necessary elements of tourism development requires the expansion of the establishment of centers of tourism and hotel training to raise the level of tourism services.

W- to spread awareness among the citizens of the importance of cultural tourism and the use of media as one of the main sources of tourism in this, as well as work to improve the

Y. image of tourism in foreign campaign awareness and education is characterized by a comprehensive according the importance of archaeological sites to reflect the civilization

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